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THE BRITISH PTERIDOLOGICAL SOCIETY

PTERIDOLOGIST

Edited by M.H. Rickard

THE BRITISH PTERIDOLOGICAL SOCIETY

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Material for publication should be sent to C. N. Page, Royal Botanic Garden, Edinburgh EL3 5LR

Editor of the Pteridologist M. H. Rickard, The Old Rectory, Leinthall Starkes, Ludlow, Shropshire SY8 2HP

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The BRITISH PTERIDOLOGICAL SOCIETY was founded in 1891 and today continues as a focus for fern enthusiasts. It provides a wide range of information about ferns through the medium of its publications and available literature. It also organises formal talks, informal discussions, field meetings, garden visits, plant exchanges and a spore exchange scheme. The Society has a wide membership which includes gardeners, nurserymen and botanists, both amateur and professional. The Society's journals the *Fern Gazette, Pteridologist* and *Bulletin* are published annually. The *Fern Gazette* publishes matter chiefly of specialist interest on international pteridology, the *Pteridologist* topics of more general appeal, and the *Bulletin* Society business and meetings reports.

Membership is open to all interested in fern and fern-allies. Subscription rates (due on 1st January each year) are Full Personal Members £7; Personal Members not receiving the *Fern Gazette* £5; Student Members £5; Subscribing Institutions £8. Applications for membership should be sent to the Membership Secretary (address above) from whom further details can be obtained. (Remittances made in currencies other than Sterling are £0.50 extra to cover bank conversion charges).

Back numbers of the *Gazette* and *Bulletin* are available for purchase from the Treasurer (address above), from whom further details can be obtained.

Front Cover: *Adiantum venustum*

EDITORIAL

MARTIN RICKARD

This is the 75th year of publication of our main society journal — *The Fern Gazette*. For many years the *Gazette* was dedicated to the fern grower and especially the variety enthusiast. It seems appropriate therefore that we should mark this anniversary by launching a new publication aimed at improving our service to growers and other enthusiasts.

The title of this journal, the *Pteridologist,* has been carefully chosen to be very general so that it can legitimately include any item of fern or fern ally interest (other than technical items which will continue to go in the *Gazette* and Society business which will go in the *Bulletin*). The title is also very distinctive and in conversation is unlikely to be confused with any other subject or journal.

I mentioned above that 1984 marks 75 years since the launch of *The Fern Gazette* in 1909 (only suspended during World War II). In fact the Society did publish *Reports and Records*, containing 2 or 3 articles a year on ferns and fern growing, annually from 1894 to 1905. For 3 years there was then an apparent lack of any publication until C.T. Druery began *The British Fern Gazette* (the 'British' was dropped in 1974). One could argue, rather loosely, that our Society publications are therefore 90 years old this year!

The point of giving this brief history is to bring the subject of the old *Gazette* before the membership as a whole. They are all still available, either as reprints or originals, from Dr Barry Thomas (address on inside of front cover). Volumes I to VIII are recommended to anyone interested in learning about fern growing, the history of our Society, or about the great varieties of the past. Volumes IX to XII are also recommended but they become progressively more technical and contain relatively little of interest to the grower, but, of course, are a source of much information on subjects of international fern study.

The earlier *Reports and Records* are not currently available, but it is hoped that these too may be reprinted in the not too distant future.

While on the subject of early Society publications, I should mention *The Book of British Ferns* by Druery. This was not published by the Society as such, but it was the result of work by a Society Committee set up to enumerate all the worthwhile varieties. This was published in 1903 and copies are still sometimes available through 'BPS Booksales' Perhaps it is time for the Society to think about an update of this volume?

For many years the Society's journals have published many new varietal names — most illegitimately. This might sound like irrelevent botanical jargon, but I am sure most members can see the sense in giving some guide to future recognition of a new cultivar, other than simply a name. In this issue 3 new varieties are described and two of them are illustrated. By next year the Committee hope to be able to draw up a standard format for the publication of new variety names. When available these guidelines will be included in a future *Pteridologist.* Our President, Clive Jermy, touches on this problem in his account of the Scaly Male Fern in this issue. Our past President, Jimmy Dyce, is also working in this area, and is currently in the final stages of preparing a glossary of fern variety names

The production of this first issue of the *Pteridologist* only five months after the recent *Bulletin* is a tribute to the efforts of many contributors who have kept me well supplied with suitable material. I thank them all, but I must single out Richard Rush for special mention; not only has he contributed several items but he has also designed our new cover — against a very tight time schedule. In addition he has designed the covers for future *Bulletins* and *Gazettes* (beginning with Volume XIII).

This brings me to the subject of material for future *Pteridologists*. May I take this opportunity of gently reminding members to continue to send me suitable articles?! Items illustrated with black and white photographs would be particularly welcome, as would news of new varieties raised or found.

DRYOPTERIS DILATATA 'CRISPA' WHITESIDE

REGINALD KAYE

I forget how many years it is since Robert Whiteside offered me his collection of ferns, which he was unable to take to his new home in Morecambe. The collection was planted in a north sloping quite extensive garden in Lancaster with a stream at the bottom and most of the ferns were in fine fettle though the labels were all over the place as a horse had got in and rampaged through the garden.

Amongst the ferns was a small moribund stump which Bob informed me was the sole plant of a fine crisped variety of *Dryopteris dilatata* which he found on Clougha, near Lancaster. I took the object away and it spent the next three years in a shady corner with a 2-lb jam jar inverted over it. Eventually a tiny frond appeared and I planted it in the corner of a trough garden I was making at the time.

For the next three or four years it existed, only making at the most two or three 3-4 inch fronds. It was taken out and I think grown in a pot for a year or two in my mist house, and eventually planted out amongst other weaklings in a shady bed, and, I fear, forgotten about. Some three or four years later I noticed quite a good crispy frond poking up amongst the mass of British natives for which my fern garden is well known. It was removed to a new bed I was making and it has never looked back, though occasional sowings of spores always seemed to be failures.

However, a sowing made some three years ago resulted in a very strong germination from which I potted up a year or so ago a few hundred plants. These are completely uniform, beautifully crisped, the young plants under the greenhouse stage looked like a batch of *D. aemula* but are undoubtedly *'dilatatas'* and I now feel that this variety is quite in the top class. The original plant is still a single crown, but typically furnished with dark brown scales and looks like a normal *'dilatata'* until the fronds expand, and it is formally described below:

> *Dryopteris dilatata* 'Crispa Whiteside'. A form of *D. dilatata* (Hoffm.) A. Gray typical in all respects but with the blade of mature fronds 'crispy', i.e. the marginal teeth and parts of the ultimate segments turned *upwards* similar in general effect to our British *D. aemula* and *D. crispifolia* from the Azores (see p. 13).

I am particularly pleased to think that in spite of many vicissitudes what Bob Whiteside considered one of his best finds is now coming into its own.

Footnote:
It is particularly interesting that this variety should re-emerge at a time when we are becoming aware of *Dryopteris crispifolia* (see p. 13). I grow both ferns and while the *D. dilatata* 'Crispa' is only one year out of Reg Kaye's Nursery, and hence not yet mature, it is clear that there are many similarities between them. Overall they do 'look' different but it is difficult to pinpoint the differences. The only answer is to get plants of both these handsome ferns and grow them side by side. *(Editor)*

RAISING PTERIDOPHYTES FROM SPORES: THE SPECIAL CASES

RICHARD RUSH

Although they may differ considerably in their requirements or preferences when mature, most ferns can be raised from spores by an effective standard procedure. How widely applicable is this assertion, the like of which we may have read? Can we infer that "most ferns" means "mainstream ferns" or "typical true ferns"? If so, can we assume that groups which would seem to be excluded, such as Ophioglossaceae, aquatic ferns (such as *Azolla* and *Salvinia*), and, of course, the fern allies, will usually not be raisable?

This article arose because, seeing *Hymenophyllum* and *Selaginella* species in spore lists I realised that I did not know whether either was raisable. It was only by chance that I learned that *Hymenophyllum* spores are green and short-lived — and it was by then already too late as far as the spores I had were concerned. Deciding to enquire further into such matters, I thought it would be useful to broaden the scope of my enquiries. Cultivation books generally have nothing to say on raising fern allies and "atypical" ferns (Hoshizaki 1975, as I belatedly discovered, is more informative than most, but what she says on raising *Selaginella,* for example, is not in the chapter on "Propagation" nor under the main coverage of the genus). Much attention now seems to be given to spore architecture, but usually (in books) none to the stages and cycle, and aspects thereof, in between. Is it not curious that we are not shown gametophytes, and the early stages of sporophytes? Most fern books seem primarily concerned with identification of species, as sporophytes. Nevertheless I find it difficult to understand why, learning that filmy ferns have green spores (for example) and then back-checking with modern books, such features are not usually even briefly noted.

I will attempt to clarify some questions of raisability, to note special factors such as short-lived spores, and to suggest, more generally, that even while the object of our spore cultures may be to produce new ferns for our gardens they might also be a source of interest in themselves. I am much obliged to Clive Jermy and Barbara Parris for answering questions on raisability and for additional notes and comments. My concern, I should say, was expressly with deliberate raising from spores, using simple methods. Ease or difficulty of cultivation thereafter need not invariably relate directly to ease or difficulty of raising. What is unraisable need not be ungrowable, while what is easily raisable can be demanding in cultivation.

Speed of germination

An open question mentioned to me was whether there might be some correlation between the epiphytic habit and slowness from spores. Most epiphytes, it was noted, seem to have filamentous prothalli, as distinct from the more familiar cordate prothalli; a point worth bearing in mind when we have no idea of how, once raised, a species should be treated. There are cases (not often occurring with ferns we could easily accommodate and would be likely to try) where slowness from spores is carried to an extreme, in that prothalli may be long-lived and disinclined to proceed to the sporophyte generation. I understood that this was so with *Dipteris* but don't know how to square this, as reportedly the common experience, with the very short viability of spores given in Lloyd & Klekowski, which would make raising prothalli unlikely to be common away from established plants. Some gametophytes, those of a *Vittaria* species occurring in N.America being a known example, become established in asexually reproducing colonies, without (or only very rarely, and then not successfully establishing) sporophytes arising. Seemingly this phenomenon occurs where the gametophyte generation has developed beyond the range in which sporophytes could survive, demonstrating what, as amateur fern raisers, we might suppose from observation of spore cultures: that gametophytes sometimes seem

either more *or* less hardy than we would expect. How common, it might be asked, is the capacity for asexual reproduction in and of gametophytes — how much has this been studied — and is it a response to adversity? Subjecting spore cultures to adversity has been brought to a fine art by some of us, so this might be an area in which amateurs might make interesting observations. I put it to botanists that they might consider suggesting specific points which amateur fern raisers might pay particular attention to.

Green spores

Green spores are chlorophyll-bearing spores of limited length of viability (exceptionally to about 1 year, usually far less). Green-spored pteridophytes are a minority and are usually plants of consistently wetter places. The majority of ferns have non-green spores, with a capacity for dormacy. Germination (meaning, following Lloyd & Klekowski, breakage of spore wall and the beginning of prothallial development) of green spores is normally notably rapid, decreasing as spores age: this need not mean that sporophytes are quickly raised, for in some cases the gametophytes, once developed, can be very slow growing. Sowing green spores as soon after collection as possible is usually advisable, and quite often is essential. With *Osmunda* it is known that length of viability can be increased by storing spores, sealed in a refrigerator. Green spores have relatively high water content and commonly rapid respiration: refrigeration (we might suppose) slows this down and thereby prolongs viability. We could therefore suppose that refrigeration would be effective in the same way for other green spores, of tender as well as hardy species.

Presuming that we should normally want to raise ferns as a means of acquiring species which we do not already have, the first obstacle to success is obtaining fresh spores. On the figures given in Lloyd & Klekowski of known viability duration it might generally be said that while, in seeking spores, we will often have to gamble on their swift passage through the post, the attempt will very often be worthwhile. Most particularly with the shorter-lived spores, the sender might first sow them fresh and send them germinated, with moist peat or sphagnum; or the fresh spores may be put on a plug of moist peat in a plastic tube, plugged to pressurise the contents, where they will begin to germinate in transit. In some cases germination can commence even while the spores are still in sporangia: a small piece of fertile frond could be sent. There is obviously some scope for experimentation.

While non-green spores, such as occur in most ferns, are usually longer-lived than green spores, there are known short-lived non-green spores as well as others of considerable longevity (e.g. 70 years). In some, perhaps most or all, of the families where green spores are the norm this, Lloyd & Klekowski postulate, may represent the primitive condition. Being nearly always plants of consistently wetter places, short-lived spores are at no disadvantage. Green-spored species occurring as exceptions in otherwise non-green-spored families, they suggest, may have green spores as a derived condition, these conserving the energy otherwise required for producing spores capable of dormancy. Allowing for my rewording, this last does not seem (to me) so compelling as an explanation, in itself, as to justify their description of the green-spored condition in these exceptional cases as "most likely derived". An obvious hypothesis would be that these exceptions might be primitive members of generally more advanced groups: if ancestors of modern *Matteuccia* spp. had had non-green spores would there have been advantages in losing the dormancy capacity such as would outweigh the advantage most modern ferns apparently find in non-green spores? Could it not be that having, or having developed, unusually long-lived green spores *Matteuccia* has sidestepped the general evolutionary pressure favouring non-green spores — or has evolved an alternative "solution". With *Osmunda* (perhaps!) extravagant production of spores might be another alternative, so how does spore production of green-spored exceptions compare with that of non-green spored ferns in the same families? The exceptions noted by Lloyd & Klekowski are nearly all green-spored *genera* (such as *Matteuccia*) within

primarily non-green-spored families. More surprising and intriguing are exceptions within a genus: they report one such certainly known (and another, courtesy Barbara Croxall, is noted here), and they mention another as an as yet unconfirmed possibility. We would surmise that further such exceptions may remain to be recognised: rapid germination occurring at all, and the green colour itself fades (after several weeks with condition is not known at the outset the latter is a factor diminishing the likelihood of germination occurring at all, and the green colour itself fades (after several weekss with *Osmunda*). New observations of green-spored exceptions would usually depend upon access to living, spore-bearing plants, a suspicion that the spores are ripe when green, and then controlled and carefully observed experimental sowings. In short the green-spored condition is quite likely to go unrecognised.

Lloyd & Klekowski's paper is fascinating and most instructive, drawing upon a wide range of published sources as well as on their own studies. I've here abstracted only such data as seems pertinent to this article: i.e. while heavily indebted to the paper this is no thorough digest, and no adequate substitute.

Notes on individual families

KEY: Gs = green spores; Lv = length of viability (derived from Lloyd & Klekowski); Het. = heterosporous (= having mega- and microspores: most ferns are homosporous, having one kind of spore); CJ&M = Crabbe, Jermy & Mickel 1975; L&K = Lloyd & Klekowski 1970; J&C Jones = Jones & Clemesha 1981; BJH = Hoshizaki 1976.

Psilotaceae: *Psilotum* — subterranean gametophytes; perhaps raisable keeping spore cultures in dark (?). BJH says intentional raising rarely successful: results have been achieved by sowing spores into pots of other plants in greenhouse. Growable & grown. *Tmesipteris* — cultivation requirements little known; high humidity necessary. Raisable? Probably requires soil fungus/mycorrhiza.

Lycopodiaceae: *Lycopodium* (etc.) — can be raised, but very slow. Though spp. are generally difficult to grow, J&C describe epiphytic spp. as generally easier.

Selaginellaceae: *Selaginella* — Het., raisable (mega- and microspores needed). BJH suggests cutting mature, sporangia-bearing leaf tips into ½" lengths and scattering them on sandy mix.

Isoetaceae: *Isoetes* — Het., raisable only with special techniques (Sam 1982 gives some refs.). *Stylites* — as for *Isoetes?*

Equisetaceae: *Equisetum* - Gs. (Lv for spp. instanced in L&K in the general region of 12 days). Raisable. Gametophytes subterranean in nature, but L&K found spores germinated at a constant rate under different light and temperature regimes tried. However, keeping spore cultures dark would seem advisable.

Ophioglossaceae: *Botrychium, Ophioglossum, Helminthostachys* — gametophytes subterranean. If tried, spore cultures might best be kept in dark. Whittier 1981 is not encouraging, excepting that ease of achieving germination and the regimes required seem to vary between spp. Raising gametophytes may not be entirely impossible in every case: prothalli have a symbiotic relationship with a fungus — sporophytes seem not raisable deliberately.

Osmundaceae: *Osmunda, Todea, Leptopteris* — all Gs., Lv, where known: *O. banksiaefolia* about 10 days; *O. cinnamomea* 43-54 days (source cited by L&K is work by Y. Okada: it might be inferred that figure relates to var. *fokiensis*); *O. japonica* 23-43 days; *O. regalis* 150-210 days; *O.r.* var. *spectabilis* under 240 days. N.b. Lv for *O. regalis* derives from work by E. Gerhardt, published 1927, that for var. *spectabilis,* which is in no conflict with Gerhardt's finding in Europe, from L&K's own studies — so why is Lv of *O. regalis* often described as a few days only?

Plagiogyriaceae: *Plagiogyria* L&K put question mark against spore colour for 2 spp. mentioned: Lv for *P. semicorata* over 1.5 years. Germination very slow.

Schizaeaceae: *Schizaea* — prothalli have symbiotic relationship with fungus and there is

no record of success in raising (J&C). Applicable also to closely allied *Actinostachys?* CJ&M include *Lygodium, Anemia* & *Mohria* in this family, but *Lygodium* spp. reputedly usually easy from spores and I know of no reason for assuming *Anemia* and *Mohria* problematical.

Parkeriaceae: *Ceratopteris* — Homosporous unlike most aquatic ferns: should be easily and quickly raisable — they can take as little as 29 days from spores to spore producing plants. Spores can germinate when submerged or on wet mud in nature (J&C). Lv of *C. thalictroides* about 5 years.

Hymenophyllaceae: *Hymenophyllum, Trichomanes, Mecodium* etc. (filmy ferns). A large family with many genera and spp.: Gs., Lv short — L&K give 19 days for one sp., 6 days for another. We could assume Lv generally a few days only. In 2 *Mecodium* spp. studied germination occurred in sporangia. Fresh spores (or ripe fertile fronds might be better) could be sent by plastic tube method outlined. For 7 *Hymenophyllum* spp. studied germination was within a few hours. After germination, however, filmy fern prothalli seem normally extremely slow growing.

Gleicheniaceae: *Gleichenia, Sticherus, Dicranopteris* etc. — spores non-green but L&K report Lv of 10 spp. in 4 genera as only 150-180 days. Holttum & Woodhams 1976 describe cultivation difficulties, but see J&C for spp. more suited to wider cultivation than those grown at Kew.

Dipteridaceae: *Dipteris* — non-green spores, L&K say, but add question mark. Lv of *D. conjugata* few days only. Curious ferns, reputedly ungrowable, but success has been achieved at Kew on nutrient deficient substrate.

Grammitidaceae: *Grammitis* etc. (many genera) — all Gs. Lv of examples in L&K under 45 days. Spores can germinate in sporangia; whole sori on leaf tissue might be sent in airtight capsules. So far as I can ascertain they would seem as difficult to raise as they are, notoriously, intractible in cultivation. Most occur on mossy trees, sometimes rocks, in cloud-zones on tropical mountains and are seemingly highly evolved and specialised. CJ&M include*Loxogramme* in this family: it is variously treated by modern authors, often included in Polypodiaceae. I believe none of the above applies; that *Loxogramma* spp. can be and are raised and grown and (by supposition) are unlikely to have Gs. Horticulturally at least more like Polypodiaceae I think: if sporelings I have are *Loxogramme* sp., similarly slow.

Marsileaceae: *Marsilea, Pilularia, Regnellidium* — sporocarps. Lv of *M. vestita* over 68 years. Easy: prick sporocarps with pin to allow water in, place in dish on moist blotting paper.

Salviniaceae: *Salvinia,* and Azollaceae: *Azolla* — sporocarps, rarely produced (Mickel 1979).

Exceptions in otherwise non-green-spored families:

Polypodiaceae: 2 genera with Gs. *Christiopteris* and *Marginariopsis. (C. tricuspis,* Lv under 60 days; *M. wiesbaurii, Lv under 90 days).*

Aspidiaceae (Aspleniaceae subfamily Athyriodeae of CJ&M): *Matteuccia* – Gs. (Lv of *M. struthiopteris* under 1 year); *Onoclea* — Gs. (Lv circa 1 year); *Onocleopsis* — Gs. (Lv of *O. hintonii* 120-150 days).

(Subfamily Dryopteridoideae of CJ&M). Spore colour of *Dryopteris viridescens* queried by L&K, Lv reportedly 30-100 days. (I've had and sown spores of this species, which were fresh. I didn't, at the time, pay attention to spore colour, but am sure the donor would have noticed something as remarkable as Gs. in *Dryopteris*).

Blechnaceae: 2 Gs. spp. known, *Blechnum nudum* (Lv circa 90 days), and *Stenochlaena sorbifolia* (not in L&K). Could there be more?

Note: My friend Cor van Moesdyk reports successfully storing *Osmunda* spores in a freezer, at —20°C. He found spores of *O. regalis, O. claytoniana, O.r.* 'Purpurascens', and

O. cinamomea were viable after 2 years — and some after 3 years. Page 1982 expressly says that while spores may be kept in a refrigerator, a deep-freze should not be used.

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BOOK REVIEW

A MONOGRAPH OF THE FERN GENUS PLATYCERIUM (POLYPODIACEAE) BY ELBERT HENNIPMAN AND MARCO C. ROOS. NORTH-HOLLAND PUBLISHING COMPANY, AMSTERDAM, OXFORD, NEW YORK, 1982. 126pp, 4 COLOUR AND 8 MONOCHROME PLATES, 31 FIGS, 170 x 243 mm. PRICE : Dfl.75 (c£14.00).

This new thorough evaluation and revision considers in depth existing literature, primarily that of Barbara Joe Hoshizaki. Of the 18 species best known in the United States, two are reduced to the botanical ranking of sub-species, two are reduced to varieties of sub-species, two are changed from one species' name to another, and 12 species' name persist as previously known — for a total of 15 species, two varieties (var.) and two sub-species (ssp.), as follows:

HOSHIZAKI	HENNIPMAN AND ROOS
1. P. vassei	1. P. alcicorne
2. P. andinum	2. P. andinum
3. P. bifurcatum	3. P. bifurcatum ssp. bifurcatum var. bifurcatum.
4. P. hillii	P. bifurcatum ssp. bifurcatum var. hillii
5. P. veitchii	P. bifurcatum ssp. veitchii
6. P. willinckii	P. bifurcatum ssp. willinckii
7. P. coronarium	4. P. coronarium
8. P. angolense	5. P. elephantotis
9. P. ellisii	6. P. ellisii
10. P. grande	7. P. grande
11. P. holttumii	8. P. holttumii
12. P. madagascariense	9. P. madagascariense
13. P. quadridichotomum	10. P. quadridichotomum
14. P. ridleyi	11. P. ridleyi
15. P. stemaria	12. P. stemaria
16. P. superbum	13. P. superbum
17. P. wallichii	14. P. wallichii
18. P. wandae	15. P. wandae

This book was also reviewed in the *British Fern Gazette,* 12, 166 (1983).

RALPH H HUGHES

WILLIAM LATHAM AND HIS HYBRID TREE-FERN

A R BUSBY

William Bradbury Latham was born at Bicknacre, near Maldon, Essex, on February 13, 1835. He began his gardening career at the age of 13 in the garden of William McNeil, Esq. of Wandsworth Common. After three years' apprenticeship, he joined the nursery of Robert Neal. His interest also embraced botany and he began collecting British plants. At twenty years of age, he entered the Royal Botanic Gardens at Kew, spending much of the next 2½ years with the Palm, Heath, Orchid and Stove houses. After Kew, a short time was spent under Sir Joseph Paxton at Chatsworth House, Derbyshire. Yet again, within a year, he had moved to the Jardine des Plantes, Paris. A year later, he returned to England to work in the greenhouses of Messrs Parker and Williams nursery at Holloway. From Holloway he was appointed gardener to Lt. Col. Perkins, Birtley Hall, Chester-le-Street, County Durham, in whose service he remained for eight years. Apparently, the collections at Birtley Hall included a fine assortment of ferns.

In 1868, Mr Catlin retired from the curatorship of the Birmingham Botanical Gardens in Westbourne Road, Edgbaston and Mr Latham was appointed to the office — a position he was to hold for 35 years. When he retired in September 1903, the Trustees of the Gardens expressed their great regret at his leaving, presenting him with a framed testimonial and a modest pension. In his time at the Gardens, he was responsible for many improvements including the extension of the glasshouses and the erection of a grand Palm House which was achieved by the private subscription he encouraged amongst the friends of the Garden. He earned an enviable reputation as a sound, all-round gardener of great knowledge, the foundation of which, must have been his wide travels to many gardens as a young man.

After his retirement, Mr Latham lived at Rowington, near Warwick but about 1911 he moved to Leighton Buzzard. He died on the 17 December 1914 at 1 Green Hill, Leighton Buzzard.

William Latham was a keen hybridiser of plants, particularly orchids but his great achievement was the result of an accident and the results of this happy accident can still be enjoyed at the Botanic Gardens. It is a magnificent hybrid tree-fern, *Dicksonia x lathamii*. Presumed to be the only example of a known hybrid tree-fern in cultivation in the world, it aroused much interest when first described in the horticultural press. Mr Latham published an account of how this hybrid was raised, in the *Gardener's Chronicle* dated 28 November 1885, and I can do no better than to reprint it here:—

> "Some years ago I had under my care a plant of the very rare *Dicksonia arborescens,* an imported plant, with a clear stem of from 3½ to 4 feet in height, and having so completely the character of that figured in Hooker's Species Filicum (i., t.22) that I have no doubt it was the true plant. I collected spores from this plant and sowed them in a 5 inch pot, at the same time sowing in another pot of similar size some spores of *D. antarctica.* These pots were placed side by side. In due time the prothalia came up very freely in the pot of *D. antarctica,* but not so in the case of *D. arborescens.* Amongst those in the pot of *D. antarctica* I noticed two very distinct from the rest, and these I carefully watched from day to day, and when at length the first little frond made its appearance I was delighted to see something different from the rest and what then appeared to be *D. arborescens.*
>
> "For some years after, while the plant was in a young state, it was supposed to be the latter plant, but when it began to develop its stem and the fronds grew to their full size, I saw it was distinct and had combined the characters of *D. antarctica* and *D. arborescens,* which I now believe to be its parents. The spores in some way having got mingled in the seed pot.

> "In the texture of its fronds it is very much like *D. arborescens* but the general character of the plant, taken as a whole, comes nearest to *D. antarctica,* the stem quite resembling that of the latter, only being stouter, while *D. arborescens* on the other hand has a thinner, more slender stem in the way of that of *D. squarrosa*. The habit of throwing up the young fronds one after the other and not all at one time to form a new crown of foliage, is also foreign to *D. antarctica,* and more nearly resembles the mode of development in *D. arborescens.*"

Regrettably, *D. arborescens* has long since disappeared from the gardens and I have not been able to track down a living specimen in Britain. It is native and still to be found in St. Helena. It is still possible to compare *D. x lathamii* with a large plant of *D. antarctica* which grows close by and Mr Latham's comments are quite true, especially concerning the manner in which the new crown of fronds is produced.

I have also examined the spores of *D. x lathamii* and they appear as white, poorly developed or badly wizened spores, however there appears to be a tiny percentage of healthy, golden brown spores which may prove viable. I feel that there is a lot more we can learn from Mr Latham's hybrid tree-fern.

Another hybrid fern that Mr Latham is credited with (see *Gardener's Chronicle* 1914) is *Gymnogramme x lathamiae,* the parents being *G. decomposita* and *G. schizophylla,* but I know nothing of its history. There was also a hybrid between *Alsophila excelsia* and *Cyathea insignis,* (see *Gardener's Chronicle* 1904). It would appear that these other crosses of Mr Latham never survived.

Acknowledgements:
I would especially like to thank Miss Edith David of Streetly, Sutton Coldfield, West Midlands for her kind interest and for allowing me to use material from her historical files concerning the Birmingham Botanical Gardens.

SHORTER NOTE

The Ecology of British Rail in North Humberside

The disused railway line between Selby and Market Weighton has been a source of natural history interest for many years. Of particular note is the old red brick station at Foggathorpe (a Viking name) where the lime-rich mortar supports a diverse and attractive community of plants, including a number of ferns uncharacteristic of the barren wastes of North Humberside.

The ferns include the ubiquitous *Dryopteris filix-mas* and its close relative *D. affinis* (I have yet to grasp the subspecies!) with plenty of *Asplenium ruta-muraria* and *D. trichomanes* (dittol). Even *A. scolopendrium,* uncommon in our region, is plentiful here, like the other *Asplenium* species, "attracted" by the limey mortar.

Some ferns may carry this calcicolous habit to extremes like the fanatical *Dryopteris submontana* and *Gymnocarpium robertianum* which grow native on the limestone pavements of the Yorkshire Dales and a few other limestone localities.

It is therefore no surprise for the pteridologist to find the latter here in this tiny village between Bubwith (also Viking) and Holme-on-Spalding Moore. (see opp. p.13.)

It would seem that the Foggathorpe *G. robertianum* is no singular occurrence. The Atlas of the British Flora shows nine other records from walls.

JAMES MERRYWEATHER

(Adapted from the newsletter of The University of York Natural History Society)

THE SCALY MALE FERN — PROBLEM FERN NUMBER ONE

A. C. JERMY

For over 200 years, amateurs who have studied the natural sciences have been able to contribute, through observation and subsequent deduction, to the core of knowledge and understanding of their subject. Much of the recording of the British flora in the latter half of the 19th century was done by such people, many of them reverend gentlemen with time to spare, or others in a professional capacity who had the leisure hours to roam the woods and hills. However, in the 20th century the study of the various sciences became more and more sophisticated with the involvement of elaborate equipment. The contribution of amateurs became less, or was directed to specific areas where they could maintain their status as responsible recorders.

As far as the study of ferns is concerned, study of the distribution and variation of British ferns remained the prerogative of many a keen amateur botanist. The cultivation of ferns, in heated 'stove' houses and later in the garden, was linked to an increase in the commercial interests of the latter part of last century and the Victorian fern craze, so well documented by David Allen (1969) and others. The cultivation of interesting variants found in the wild, established a group of people that eventually formed our own Society. But although such British plants and cultivars and exotic species could be purchased from commercial growers, there was still the great urge to go out into the wild in Britain and look for oneself. Such excursions became less and less fruitful it seems, and this aspect was touched upon by an interesting paper by Richard Rush in *Bulletin* Vol.2, No.5 (1983), and again by Martin Rickard in this Journal.

For those people who were interested, there was still much natural genetical variation in our wild fern flora to stimulate the minds of many keen botanists. Both Edward Newman and Thomas Moore wrote extensively on the subject between 1840 and 1880 (see this Journal, p.17). Many others, e.g. Wollaston, Sowerby, Sim, Ley, Borrer, Druce, Stansfield and Greenfield, observed, experimented (in the garden at least), and commented on the taxonomy of our native ferns. Then in 1950 when it seemed that everything about our native flora must be known, a book was published called *'Problems of cytology and evolution in the Pteridophyta'* by Irene Manton. Professor Manton, a past-president of our Society, showed that by comparing the numbers of chromosomes, and how these reacted to each other in artificially made hybrids, that one could deduce much about the origins and interrelationships of our fern flora. This study of fern chromosomes was, unfortunately, a barrier for many keen amateurs because it required a high-powered compound microscope, a certain amount of skill and the knowledge of how to go about preparing a plant sample so the chromosomes could be seen and studied. It was then, a sophisticated technique which few amateurs could pursue and it became the prerogative of the university or research institute-based botanist. The knowledge gained from it, and from similar techniques used with flowering plants, was accepted but not always understood by the amateur fraternity.

There is one other aspect of botany that has confounded the amateur botanist: the field of nomenclature. The question as to what is the *right name*, at any given time, to call even our common plants seems to be the prerogative of, again, a professional — not so much a scientist but more a lawyer. The naming of plants with binomial Latin names as has happened since 1753, must follow procedures laid down in an *International Code*. This *Code* is amended from time to time by the I.A.P.T. (International Association of Plant

Taxonomy) when they meet at International Botanical Congresses. Similarly there is an *International Code of nomenclature of cultivated plants* (1980). One important principle built into the *Code* is that plants should rightfully be called by the *earliest* specific name given to them. The same general principle applies to Latin names at all ranks, whether subspecies and varieties, or genera. This means we must take into consideration the views and names given by the earlier botanists. Another important aspect is that the original specimen described (the Type specimen — hopefully preserved in an herbarium) should be taken as the base-line to show the concepts of the original author rather than his printed words or later interpretations of them. This in itself would not be so bad but to compound the confusion is the fact that the concept of what species a genus may contain depends on the view (considered opinion) of the individual researcher or botanist. To give examples, the reason we lost *Aspidium, Nephrodium* and *Lastrea* was because they were illegitimate, for one reason or another, according to the *Code*. On the other hand, as to whether you use *Gymnocarpium, Oreopteris* or *Phegopteris* or place them all under *Thelypteris* depends on your generic concepts, i.e. it is a *taxonomic* (opinion) rather than a *nomenclatural* (legal rule) problem. Whatever the problem, names get changed too frequently, some would say.

Whilst I do not want to condone constant name changing, for the most part in our British ferns, the changes have been legitimate and necessary. The most important thing is that both the names we give to ferns and our concepts of how they should be classified, i.e. their taxonomy, should be as practical as possible. I have touched on a number of matters which might well be elaborated in the pages of future issues of this Journal, but the real purpose of this paper is to put forward a suggestion about *Dryopteris affinis*.

The variation of the male fern *Dryopteris filix-mas* group was noted by Edward Newman in his *History of British Ferns* (1854). He described three varieties of it, or to quote him, "three prominent forms which constitute links in a chain ... the entire chain constituting the species": var. *affinis,* var. *borreri* and var. *abbreviata*. The latter is *D. abbreviata* more properly called *D. oreades* Fomin for nomenclatural reasons (see Fraser Jenkins & Jermy 1976 for details). The former variety we would now include in *D. affinis* itself, although Newman was confusing it with a Russian species *D. caucasica* (A.Br.) Fras.-Jenk. & Corley that we now know to be one of the parents of *D. filix-mas*. The third variety was referred to for the next 100 years, in British fern literature at least, as *D. borreri* Newm. until Holob (1967) showed that for nomenclatural reasons the correct name was *D. pseudomas* (Woll.) Holub. The story did not stop there because Christopher Fraser-Jenkins in his study of the genus world-wide, realised that the plant described from Madeira as *Nephrodium affine* by R.T. Lowe, in 1838, was indeed the first name to be used, hence *D. affinis* (Lowe) Fras.-Jenk.

So much for nomenclature but what of the taxonomy? Fraser-Jenkins (1980) has given us the most recent treatment of this group and in his assessment he used the cytological evidence of Manton (1950) and an earlier German worker Döpp (1939). They found that both diploid and triploid levels occur in the complex and that both are apogamous (agamosporous), i.e. they can form new plants on the prothallus, direct from the egg cell, without fertilisation. This means that plants with unbalanced chromosome cells such as triploids, which are normally sterile, can give rise to new progeny. It also means that the additional genes, that would in normal sexual reproduction help to even out the minor variations, are missing, and that each genetical form of *D. affinis* is reproduced identically and because of its constancy has tended to be recognised and named at various ranks

Fraser-Jenkins reviews the origins, distribution and relationships of *D. affinis* and proposes a taxonomy which, through the synonymy listed at least, summarises the work

of continental botanists. Chromosome counts quoted have been made by M. Gibby and J. Schneller. He follows the principle "that some of the variants may be genomically distinct from others and worthy of higher taxonomic rank than that of variety or forma, being of a fundamentally different biological nature". These elements he recognises as subspecies and says that "it would be impractical and unwarranted to recognise them at specific rank ... and would cause widespread confusion in herbaria and floristic lists where species have to be determined in order to name plants while subspecies may be ignored, if necessary". He goes on to describe 11 varieties in 6 subspecies. It is confusing and the author himself admits that his ideas are by no means firm. Hybrids of both cytotypes with *D. filix-mas* and *D. oreades* are frequent and add to the variation and confusion because the agamospory is inherited and the plants are fertile. Fraser-Jenkins (pers. com.) now believes there are three or possibly four subspecies in Britain; *affinis, borreri, stilluppensis* and *robusta,* which he is inclined to place under *borreri.*

The latest view is that of C.N. Page (1982) who described these four subspecies within the framework of Fraser-Jenkins' treatment. In a recent review (Jermy 1984) I was critical of Page's attempt to equate his field knowledge of the British plants, which is more extensive than C.F-J.'s, with the latter's published account. In fact, on reflection, I think he did a better job than C.F-J., whose accounts are by no means comparative, but the situation is nevertheless still confusing. Page agrees that more fieldwork needs to be done. He points out that in Britain, subsp. *robusta* appears to be distinct. I agree with this but the plant is very difficult to tell from the hybrid *D.* x *tavelii (D. affinis* x *filix-mas).*

The amateur botanist can indeed help with careful observations. As a case in point, I illustrate the indusium of two of the commoner subspecies: *affinis* and *borreri* (Figs. 1 and 2). On the BPS Brathay field meeting, 1980, Dr. Jacob Schneller pointed out this diagnostic character; C.F-J. describes it for some of his subspecies but Page omits any mention. In subspecies *affinis* the indusium is thick, inflected at the margin,even when mature, being pushed up like a hamburger bun and frequently splitting, as the pressure of expanding sporangia becomes too great. Subspecies *borreri,* on the other hand, being thinner, though inflected when young, becomes flatter on maturity. Subspecies *stilluppensis,* which may be common in the west on well drained hillsides (Page 1982; C.F-J. *pers. com*) has thickish indusia generally, similar to *affinis* but rarely splitting, and has the finely punctate texture and pale brown colour of *D. oreades.* Unfortunately, I could not find comparative material to illustrate. I hope this may help the reader to distinguish at least these two types and encourage him to make further observations in the field.

As a further point for consideration, I suggest we accept these distinct cytotypes at specific level: *D. pseudomas* (= subsp. *borreri*) and *D. affinis* (= subsp. *affinis*).

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Figure 1
Dryopteris affinis subsp. affinis.
Close up of pinnule x15. Cwm Grianog. Ogwen, N. Wales.
Note the thick indusium splitting (arrowed).

Figure 2
Dryopteris affinis subsp. borreri (D. pseudomas).
Close up of pinnule x15. Cwm Grianog, Ogwen, N. Wales.
Note thinner indusium rolling back but not splitting.

Dryopteris crispifolia.

Gymnocarpium robertianum among other ferns, Foggathorpe station (see page 9).

DRYOPTERIS CRISPIFOLIA — A BEAUTIFUL FERN FOR THE GARDEN

MARY GIBBY

There are hundreds of *Dryopteris* species, many of them being superficially similar in appearance, and this, together with the fact that they frequently hybridize, can make them difficult to identify. Added to this the fact that taxonomists keep changing their names means that *Dryopteris* can be a pteridologist's nightmare. Yet another new *Dryopteris* species sounds like yet another problem to come to terms with, but *Dryopteris crispifolia,* from the Azores, is so distinctive and so attractive that it is safe to say that once it has been seen it can never be forgotten.

Dryopteris crispifolia is known only from the islands of Pico and Faial in the Azores, where it grows at c. 700m in the moist laurel forest, together with other *Dryopteris* species, *D. aemula, D. azorica, D. affinis* ssp. *affinis* and, on Pico, *D. dilatata*. The species is well named; the fronds are extremely crispy, with crowded, overlapping pinnae and pinnules, and ultimate segments that bend downwards, whilst their tips and teeth curve upwards. It is a tetraploid species (2n = 164) and on morphological evidence it was suggested that it had evolved from *D. aemula* and *D. azorica* (both diploids with 2n = 82) with which it grows, probably evolving in situ in the Azores. Recently I have obtained cytological evidence that supports this view. *D. aemula* is well known for its upcurling pinnae. In contrast, in *D. azorica* the pinnules bend down from their midribs. *D. crispifolia* seems to incorporate both these features — the upcurling of one does not negate the down-turning of the other — instead the wonderful crisped effect is produced. The fronds of *D. crispifolia* are ovate-deltate, up to a metre in height, and more smilar in outline to *D. azorica* than to the triangular *D. aemula* frond. But from *D. aemula, D. crispifolia* has inherited the sessile sticky glands that give both species the fragrant scent of hay.

D. crispifolia is hardy in Britain; it survived the cold winter of 1981/2 under the snows in Martin Rickard's garden in Herefordshire, where the temperature dropped to —20°C. The plants that I have in cultivation at Chelsea Physic Garden tend to put up mostly sterile fronds, and so spores are usually in short supply. However, I am constantly trying to hybridize it with other species (no, not just to cause confusion!) and so often have young plants to spare. I do hope lots of people will try to grow it. I am looking forward to the day when it wins a prize at a horticultural show!

SHORTER NOTES

Solway Coastline Reserve

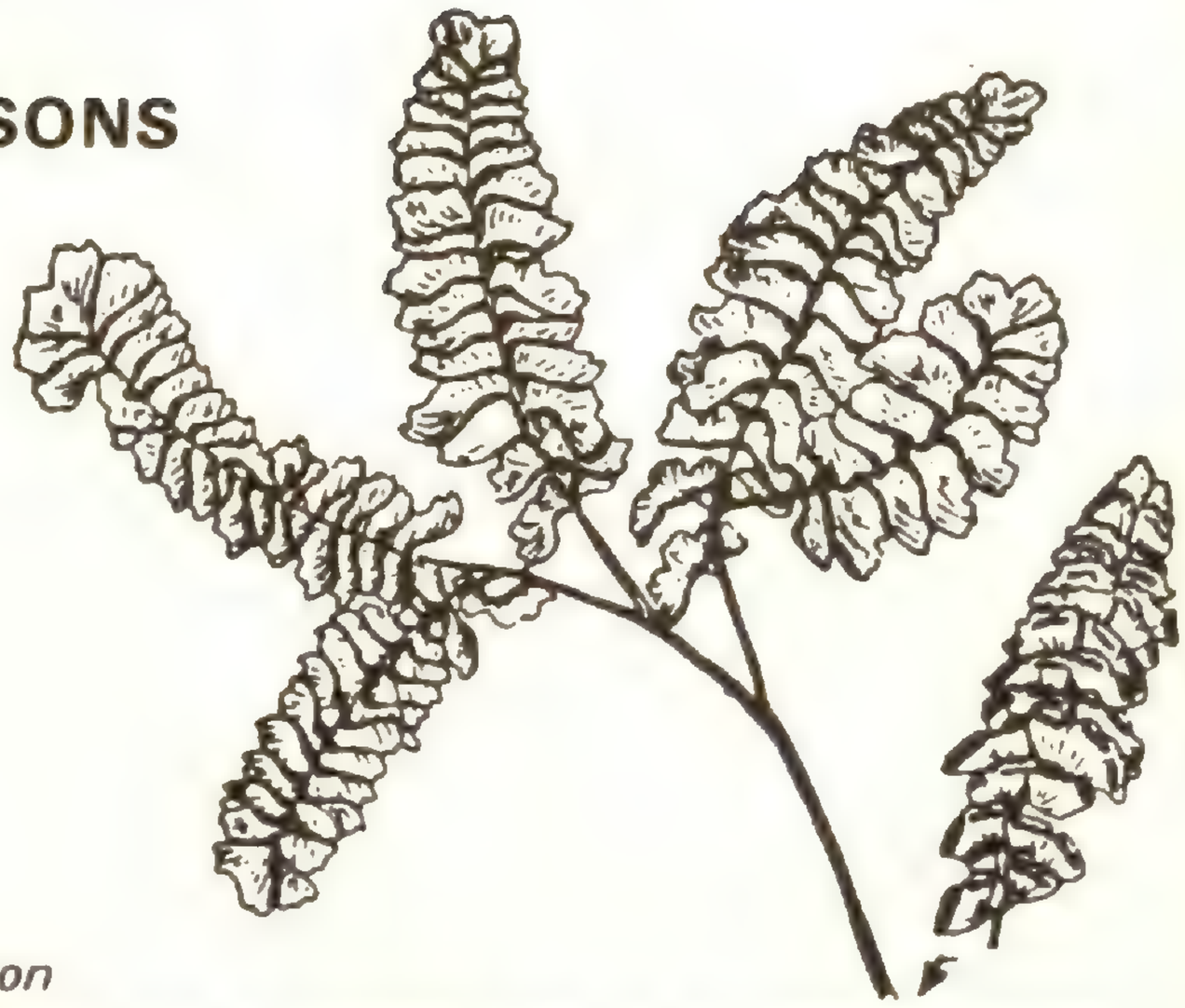
Members will be pleased to hear that the Scottish Wildlife Trust has recently purchased a strip of coastland over half a mile long at the western end of the Inner Solway complex of mudflats at Southwick. The area includes the silurian rock pillar, Lot's Wife. Inland from the merse is a stranded cliffline which supports a fine ancient oakwood. On both the rocks and the old trees are substantial populations of all three species of *Polypodium* and fine specimens of the hybrid of the Intermediate Polypody with the Southern Polypody (*P. x shivasiae*) and the Common Polypody (*P. x mantonae*).

The Secretary of the Dumfries and Galloway Branch of the SWT, Manager of the Reserve, is Dr. Peter C. Hopkins, Carleton, Bladnoch, Wigtown DG8 9AB.

A. C. JERMY

A MAIDEN FOR ALL SEASONS

JUDITH JONES



The Maidenhair dreads winter cold,
Yet an Atlantic cliff will dare,
And in a cleft its fronds unfold.
The Maidenhair,
Well satisfied with frugal fare
Of long-accumulated mould,
Will glorify the crevice bare:
Secure in that precarious hold,
The wind its loveliness must spare
To be of every one extolled —
The Maidenhair.

Fras. W. Thorrington

Black as ebony, green as the emerald sea, and as delicate as the intricate snowflake, *Adiantums* are the glory and delight of the fern world. Glaucous tracery of tissue-thin wedges, often fringed, captivate the eye of all who pass. Even the most casual plant observer can claim acquaintance with the Maidenhair Fern.

The derivation of the common name 'maidenhair' is obscured by a variety of legends. One belief held that the Maidenhair was named in honour of Venus. A German legend relates that a maiden's lover mysteriously changed into a wolf and caused her to fall over a cliff, and at that spot a spring appeared and the hair of the maiden changed into a Maidenhair Fern. According to the Doctrine of Signatures, the resemblance of the black leaf stalks to hair indicated that the fern had power to restore hair. Mixed with parsley seeds and wine the Maidenhair Fern was supposed to thicken the hair as well as promote the curliness. Pliny, a Roman naturalist, wrote that this fern was used in tonics.

Indian people have found still other uses for the Maidenhair Fern. The Quinault Indians of the Pacific Northwest burned the fronds and rubbed the ashes on their hair. Many Northwest tribes use the stalks in basket making because their black or reddish colour provides pleasant contrast to the straw or tan colour of the other commonly used fibres. The Coahuilla Indians of the Colorado Desert have used the fern, along with other herbs, in a steam bath for inflammatory rheumatism. The afflicted limbs were first rubbed with nettle! Of this treatment, one Indian writes: "The cure was very simple if your limbs were in a bad state, but rather unpleasant if in a sound condition."

The scientific name *Adiantum* is derived from the Greek word "adiantos", meaning "unwetted". This is in reference to the water-repelling properties of the surface of the fronds. Even fronds dipped in water will still appear dry afterwards. There are about 200 species found in this genus, the majority of which reside in the American tropics. But temperate to tropical these are all characterised by their dark polished stalks (stipes), the absence of a conspicuous midvein on the segments (pinnae), and the false indusium formed by a fold of the pinna margin and bearing the spore (sporangia) on the underside.

The classic elegance of the Five-Finger Maidenhair, *Adiantum pedatum,* is the backbone of the shady fern glade. Even for the gardener who demands only evergreen ferns, this deciduous beauty is the exception to the rule. I have no such rules, being an avowed fern fanatic, and hover in eager anticipation for the soft green fronds of spring to slowly unfurl into those unmistakeable fan-like pedate blades posed on slender reddish-black stipes. Within natural populations there is the uxpected variation as to the size and shape of the pinnae, as well as plant height and habit. My personal garden favourites include one form so prolific with fronds as to form a solid mound of mingled fans in full sail. Another is a

much laxer open form weighted by pinnae a bit larger and more foliose than normal, which ruffle over one another like the petticoats of yore.

A number of forms of *A. pedatum* have been given varietal names but botanists are still having trouble agreeing as to their taxonomic worth. After visiting many private fern growers in England and observing their variously named *A. pedatum* forms, I am still perplexed as to which ones can be accounted in the range of normal variation for the species and its formally acknowledged variants, *A. pedatum* 'Subpumilum', in particular, and which are decidedly different enough to deserve separate varietal status. I am not one for the willy-nilly naming of every odd or slightly different item that passes by me. A good grower knows the plants he works with from a cultivated standpoint as well as in their natural state so he can recognise a change that deviates from the normal range of population. There are a number of immediately recognizable *A. pedatum* forms in cultivation and they deserve serious study by botanists and growers alike.

I am not going to cover any of the distinctly different variations grown in England as I have not worked extensively enough with them to form a definite opinion of their varietal status. But I do want to mention a form originating from the Pacific north west. *Adiantum pedatum* var. *subpumilum* was introduced into cultivation in the 1950's by Carl S. English, Jr., horticulturist at Seattle's Hiram Chittenden Locks. Although the original source for this introduction was never released by Mr. English, wild populations have since been documented on NW Vancouver Island off the western coast of Canada. Various names have been applied to it over the years and it has become also confused with other *A. pedatum* forms in England. *A. pedatum* var. *subpumilum* carries the same chromosome number as the species and since the diminutive stature is genetically fixed it comes 100% true from spore. Minute fans overlap shingle fashion on this charming miniature and it well deserves a prime niche in the garden.

Of lesser fame but as desirable and welcome to the shady border is the so called Evergreen Maidenhair, *Adiantum venustum*. Hailing from the mountain slopes of Kashmir and one isolated site in Canada, this undulating creeper is not truly evergreen. It just seems so since the frosted fronds do not collapse with the first icy blast of winter, but instead they colour to an attractive bronze sheen and persist throughout the season. Woe betides the indolent gardener who delays trimming the old fronds before the new translucent reddish croziers herald in spring with the early dwarf narcissi. Failing to give this fern an early spring hair-cut will result in an unsightly mess of tattered old fronds crowding the fresh new ones and you will miss the delight of sunshine luminating those myriad croziers. One hint in propagating this lovely fern is to separate the rhizomes into small sections and cover shallowly in a flat of friable soil. Large divisions will often struggle feebly to resume growth or just expire outright.

The California Maidenhair, *Adiantum jordanii*, is a bit more difficult to establish than the other hardy maidenhairs. Although it is known in two isolated locales in Oregon, it is common throughout coastal California. *A. jordanii* loves shaded rocky or grassy slopes which are wet during the growing season and then later become dry. At sea level that growing season can begin in December and by early spring *A. jordanii* is actually more common than *A. capillus-veneris* which is referred to as the Common Maidenhair in California. I discovered this in my sister's Escondido hillside yard. "There is something different down here you have to see", says she. Off we went sliding through the damp red clay where we ducked under the gripping chaparrel tangle to be confronted with the unmistakeable verdant billow of *Adiantum*. Specimen in hand we scrambled back to the corroborating security of the reference books for our final pronouncement of elated certainty. Given a protected nook in the rockery, with good drainage, to insure moist but

not soggy winter feet, and a slightly dry habit in the summer, I think cultivated success with this "maiden"could be achieved.

Although I can't imagine a Maidenhair more adaptable to garden culture than *A. pedatum,* Barbara Jo Hoshizaki, prominent fern-taxonomist, considers *Adiantum* x *tracyi,* a natural hybrid between *A. pedatum* and *A. jordanii,* to be just that. This opinion may arise from the fact that *A.* x *tracyi* is truly an evergreen Maidenhair. Intermediate in morphology between its parents it inclines towards the pedate condition of the first parent with the pinnae reflecting the perfect fan shape of the second parent. Though *A. tracyi* lacks the ordered symmetry of *A. pedatum,* the cunning charm of *A. pedatum* 'Subpumilum' or the exotic show of *A. venustum,* it is a welcome addition to the shade garden. Alas that it is a sterile hybrid and not prolific to increase. Nevertheless, in my garden I have a "maiden" for all seasons.

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Fern Illustration by Vernece Sharp

DID YOU KNOW?

The oldest recorded fern variety is *Polypodium australe* 'Cambricum', found by the botanist John Ray in Wales in 1690.

DID YOU KNOW?

C.T. Druery was the most prolific writer on British ferns. As well as three books, all still very popular, he left us eight huge quarto "scrap books" of his press cuttings.

DID YOU KNOW?

One of F.G. Heath's books, the *Fern World,* ran to *twelve* editions.

DID YOU KNOW?

The most expensive book on British ferns is the folio edition of Thomas Moore's *Nature Printed British Ferns.* The price rose rapidly a few years ago and is now fluctuating about the £500 mark.

DID YOU KNOW?

In Britain our fern with the most restricted distribution is *Cystopteris dickieana* — (excluding the Channel Islands).

DID YOU KNOW?

Our dwarfest ferns are the hymenophyllums, *H. tunbrigense* and *H. wilsonii.*

J. W. DYCE

COLLECTING VICTORIAN FERN BOOKS

NIGEL HALL

The years between 1837 and 1900 saw the rise and fall of a fashion that has since earned itself the title "the Victorian fern craze". In the manner of those obsessed the Victorians exploited every aspect of fern mania. In addition to cultivating ferns they hunted them, collected them, stuck them in albums, made pictures of them, carved them in wood, cast them in iron, put them on tiles, crockery and wallpaper, designed special stands and cases for them, and built huge glass palaces to hold them. The reasons why such a craze arose are complex but having arisen there is no doubt that its progress was sustained by the literature that began to appear with increasing frequency. Much of this was fairly ephemeral; mostly in botanical and horticultural magazines. As the century progressed so the number of books about ferns increased quite dramatically. The period of the Victorian fern craze is also of interest to the student of printing and publishing. Slow, traditional skills were giving way to faster mechanical processes, and hand colouring, the mainstay of early botanical and horticultural literature, was being replaced by chromolithographic techniques and, as the century progressed, photographic techniques.

Today books about ferns are sought by a number of different types of collectors: botanists, gardeners, print historians, coloured plate collectors (alas), natural historians, and even people like myself who are interested in ferns. Victorian fern books are, for the most part, fairly easily collected. Many of the books are very modestly priced and a quite extensive collection of Victorian fern books could be formed by the collector prepared to pay from two to fifty pounds for a volume. In this review I shall concentrate on those books written by British authors and covering either the British ferns or the cultivation of ferns in Britain.

There were two books about ferns prior to the emergence of popular interest in the 1830s. In 1785 James Bolton produced the first volume of *Filices Britannicae*. This volume and the second, published in 1790, contained 45 copper-plate engravings by Bolton. The book was available with coloured or plain plates. Opinions vary about the botanical accuracy of the plates but on any other criteria this is a fine work and justifiably commands a good price on those few occasions when it appears for sale.

The other pre-fern-craze book is probably the most expensive of all fern books. W.J. Hooker and R.K. Greville issued their *Icones Filicum* in parts between 1827 and 1833. The coloured version cost the staggering price of twenty-five guineas. Today, if one was fortunate enough to be able to buy it, there would not be much change from two thousand pounds. The finished work, in two volumes, has 250 plates, each one beautifully engraved by Greville who also hand coloured every plate. W.J. Hooker was probably the nineteenth century's most eminent pteridologist and his other fern books, *Genera filicum* (1838-42), *Species Filicum* (1845-64), *A Century of Ferns* (1854), *Filices Exoticae* (1857-59), *A Second Century of Ferns* (1861), *The British Ferns* (1861), *Garden Ferns* (1861-62), and *Synopsis Filicum* (1865-68) are still extensively used today. Most had hand-coloured plates and most of these were drawn by Fitch. None of Hooker's books were, or are, cheap; however their presence gave a scientific solidity to the study, classification and cultivation of ferns.

The first 'popular' work appeared in 1837. George Francis had by 1850 published books about the arts, chemical experiments, modelling wax flowers, electrical experiments, flowers and ferns. The book about ferns, *An Analysis of the British Ferns,* is, in a way, a remarkable book. It is very accurate and carefully written, much more so than many of the books which were to follow. It had six uncoloured, engraved plates by Francis. Five editions of the book appeared, the second not until ten years after the first. No doubt the author's emigration to Australia had something to do with that. Between those two editions another author had entered the popular fern book market.

Edward Newman was a keen naturalist and writer. He was apparently 'converted' to ferns while on a trip to Ireland, the results of which were published in 1840 as *Notes on Irish History, More Especially on Ferns.* This was swiftly followed, also in 1840, by *A History of British Ferns.* It had a number of very nice woodcut illustrations by Newman. The significance of Newman's book is that it alerted readers to the interest to be gained in studying the distribution of species.

In between the publication of Newman's second and third edition appeared a small handbook that, while modest in scope, introduced an author who was to become that century's leading expert on the cultivation of ferns as well as the author of some highly collectable fern books. This small book, *The Handbook of British Ferns,* was published in 1848 and the author was Thomas Moore. Newman was, to say the least, not pleased at the appearance of this rival. He wrote, "It is difficult to notice this book ..... although there can be no rational objection to one author borrowing an occasional sentence or idea ..... he is bound in candour and in common courtesy to acknowledge the obligation" (*Phyt.* 1853, p.1157). This comment was quite unfair and only serves to illustrate Newman's obsessive notion that he alone could write the definitive fern book.

Although the *Handbook* went to three editions (1853 and 1858) it was really superseded in 1851 by the publication of Moore's *Popular History of the British Ferns.* This was one of a series of "popular" books on natural history subjects published by Reeve. It had twenty hand-coloured plates which had been drawn by Fitch. It achieved instant success. *The Gardener's Chronicle* (1851, p.823) claimed, "This stands at the head beyond all comparison". The text was simply written, straightforward and accurate. The illustrations were rather insipid and when Routledge became the publishers of the third edition (1859) the plates were redrawn by W.S. Coleman and printed, I believe, by Edmund Evans. This *Popular History* spawned two smaller books both of whch are a bibliographer's nightmare.

Those two books, identical in content but different in format, were both titled *British Ferns and their Allies* and the text was an abridgement of that in the *Popular History.* The more important of the two was, without any doubt, the one shilling edition which first appeared in 1859 published by Routledge. The small pocket-sized edition had twelve plain plates and a three colour board cover printed by Evans. Within a few years the plain plates were replaced by coloured plates. At one shilling it was easily bought, easily carried and easily used. It went through a vast number of reprints up until the 1890s appearing in a variety of covers and as a member of a number of different series. It must surely be the best selling fern book of all time and that popularity is reflected in the frequency with which it turns up in bookshops. The other volume was also very popular, cost three and sixpence, ran through at least six reprints and is also easily found today. The difference between the volumes is simply one of cover and paper.

1855 witnessed the publication of the first part of the majestic *Ferns of Great Britain and Ireland.* Nothing like this had ever been produced before and it has never been equalled since. The special quality of the book owes less to Moore's text and more to the size and beauty of the 51 elephant-folio sized nature-printed plates, the product of the genius of Henry Bradbury. The contribution of Bradbury to nature-printing has been amply documented by Cave and Wakeman in *Typographia Naturalis* (Wymondham 1967) but I must comment on the appropriateness of ferns to nature-printing. Ferns are flowerless plants which depend for their grace and beauty on the structure and texture of the foliage. Nature-printing, which would have been a failure if applied to flowering plants, recorded fern forms accurately and with great effect. The adulation shown towards the above volume resulted in the publication, in 1859, of volume one of the *Octavo Nature-Printed Ferns* and, in 1860, of volume two. The two volumes contain 113 nature-printed plates

and while they cannot have the same effect as the plates in the large volume they are still very lovely.

At the same time that the *Ferns of Great Britain and Ireland* was appearing another prolific fern author had commenced his first work on ferns. E.J. Lowe started *Ferns: British and exotic* in 1855, the first part appearing, priced one shilling, in June that year. It continued monthly until 1860 when eight volumes were complete. This work and Lowe's later colour-plate books were reissued many times and as a consequence are quite common today. The popularity of Lowe's work would surprise the reviewer of the *Gardener's Chronicle* (1858, p.91-2) who said of Ferns: British and Exotic "Future writers on ferns must erase this trash from the list of works on science ..... we can only pronounce it a treacherous companion to the unskillful in fern-lore". In all probability most of today's purchasers do not buy the volumes for the text but for the illustrations. Lowe clearly recognised the sales-appeal of the illustrations. It is therefore something of a paradox that nowhere does Lowe give thanks to or even mention those responsible for producing the plates. The 479 plates were all drawn by Francis Lydon and printed by Benjamin Fawcett. Some booksellers persist in labelling these plates "chromolithographs", but it is clear that all Fawcett's plates were drawn onto wood, engraved and then usually printed from the wood. The final volume of *Ferns: British and Exotic* was followed by the issue, again in parts, of *New and Rare Ferns* (1860-1862), which was simply an addendum to the previous eight volumes. It has 72 plates, again drawn by Lydon and printed by Fawcett.

Lowe followed with two volumes devoted to the British ferns and their varieties. *Our Native Ferns* was issued in parts between 1862 and 1867. It contains 79 coloured plates (many of which are from the earlier volumes), and over a thousand monochrome illustrations of fern varieties. Moore had identified many varieties in the *Octavo Nature-Printed ferns,* but Lowe now managed to classify 1294. By 1891, when Lowe's *British ferns and Where Found* appeared in Swan's Young Collector series, he was claiming to have identified 1861 varieties. Lowe's scarcest book was his last. *Fern Growing,* published by Nimmo in 1895, is Lowe's reflection on his hobby. Although unattractive to plate-collectors it is a highly significant book informing and illustrating, in many ways, the Victorian fern craze.

The 1850s were undoubtably the decade of the fern book. In addition to the works already mentioned many more were making their appearance in an attempt to meet the massive public demand. In 1854 were published an example of the best and an example of the worst. The example of one of the best was *The Ferns of Great Britain* with text by C. Johnson and illustration by John Sowerby. This was issued in parts in coloured, part coloured, and uncoloured versions. By 1855 the volume was complete and they had started releasing a volume on the fern allies which was completed in 1856. The two were issued together in 1859 by Bohn. An example of the worst was *A Plain and Easy Account of the British Ferns* by "E. B.". E. B. was the Rev. Edwin Bosenquet. The *Gardener's Chronicle* (1854, p.270) claimed, "We would not hurt a fly and therefore forebear to say more ..... than that it is a pity that anyone should undertake to instruct others without possessing some knowledge of the subject taught." The book did reach a second edition (1855) but a subsequent edition (1860) was rewritten by Phoebe Lankester (1825-1900).

An interesting book issued in 1855 was *Ferns of Great Britain* by Anne Pratt. The first edition is undated and had some problems prior to its publication. The volume contains an inscription, "The artist wishes it to be understood that he has purchased permission of Mr J.E. Sowerby to copy from the work lately published by him." This was included only after legal proceedings had been threatened and according to the *Gardener's Chronicle* (1855, p.423), "Even then it was conceded with the worst possible grace". The artist was in fact Anne Pratt but it is noticeable how she attempts to avoid responsibility by the use

of the term "the artist". The book has 40 remarkable plates. The plates in the first three editions were printed by William Dickes, a wood engraver, who became a Baxter licensee. The Anne Pratt plates are very good examples of that process and they are still exceptionally fresh and vivid today.

A small book, *Ferny Coombes*, published in 1856, was written by Charlotte Chanter, younger sister of author Charles Kingsley. This fairly mundane account of ferny rambles in Devonshire is significant in that it was the first of a number of books to appear in which a particular locality was featured. Later years saw the publication of *Ferns of the Axe* (1862) by Z.J. Edwards, *Ferns of Sidmouth* (1862) by P.O. HUTCHINSON, *Ferns of the English Lake Country* by W.J. Linton, and *Ferns of York* by H. Ibbotson.

As the century moved into the 60s the tide of fern books slowed only slightly. One of the most fascinating books appeared in 1865. Nona Bellairs wrote *Hardy Ferns: How I Collected and Cultivated Them.* This highly anecdotal and interesting memoir of fern collecting expeditions offers amazing insights into the fern collecting mentality. On the one hand she laments the depredation of ferns from the country-side, "We must have 'fern-laws' and preserve them like game": on the other hand, faced with a particularly large and interesting specimen, "I did what I advise others to do: I packed up a huge hamper and sent it off by rail, home".

Margaret Plues and Mordecai Cooke both published accounts of the British ferns during this decade. *British Ferns* by Plues appeared in 1866 with 16, I believe, hand coloured plates. As *The Gardener's Chronicle* (1866, p.662) put it, "This book was not wanted". However one last book did create a nich for itself. Cooke's *A Fern Book for Everybody* first appeared in 1867. It looked like Moore's one shilling book. It was the same size, had twelve coloured plates, coloured board covers and it sold at one shilling. It was evidently successful; it was reprinted at least eight times up to 1903.

The nature of public interest was now changing. The public seemed to want to know more about growing ferns. Shirley Hibberd waited until 1869 to produce *The Fern Garden.* This perceptive journalist had seen the need and supplied the desired article. His admirable book cost three and sixpence, had eight colour plates and a highly readable and informative text. The colour plates were taken from Lowe's books and were printed by Fawcett. The gilt blocked cover of the early editions is a lovely example of Victorian cover design. The book was deservedly popular and in twenty years was reprinted eight times. Public enthusiasm for ferns had waned since the heady days of the 1840s and 1850s, and it may be that Hibberd, in identifying a need, was to some extent responsible for the resurgence of interest that occurred in the last thirty years of the nineteenth century. In this second phase the focus had changed from field studies to cultivation.

The major writer on ferns to emerge during the 1870s was F.G. Heath. The use of the word "major" is to indicate "volume" rather than "significance", for while Heath was probably the most prolific writer about ferns, he was, for the most part, trivial and easily forgotten. Heath's first book on ferns was *The Fern Paradise* published in 1875. The book with its one colour plate was subtitled "a plea for the culture of ferns" and whether or not the pleas was successful many people bought it for it reached its eighty edition by 1908. Along the way (4th ed. 1878) it acquired eight coloured plates and, more interestingly, four Woodburytypes.

Inspired by success Heath, in 1877, produced *The Fern World.* Like *The Fern Paradise* this proved to be a popular book and by 1910 reached its twelfth edition. Extracts from these two books, together with extracts from Heath's *Our Woodland Trees* comprised the text of *Trees and Ferns* published in 1879. *The Fern Paradise* and *The Fern World* must certainly have sold a lot of copies. They occur frequently in bookshops today and it is interesting to

note the number of copies that have school or Sunday school prize labels on the inside cover. Heath's style is painful reading today but the language and the content were guaranteed not to cause a parent, school teacher or curate any embarrassment.

By 1881 Heath had aspired to expertise on fern distribution and written a book entitled *Where to Find Ferns,* including in it a chapter about ferns around London. The reviewer of *Field,* who presumably would not turn a hair at the shooting, trapping or chasing of wildlife, was appalled. 'When we consider how completely ferns have been exterminated in the neighbourhood of London ..... we can only regard this chapter in the light of a calamity (*Field:* 1885 ii, p.171).

Undeterred Heath continued to produce books on ferns and 1885 saw the publication of his most interesting book *The Fern Portfolio.* This had 15 folio-sized coloured plates which are, on the whole, quite well done. Heath published no more fern books in Victorian times although he produced three new fern books in the early years of the twentieth century one of which, published in 1910, was his excruciating fern book for children *Fairy Plants.*

At the end of the decade was published an impressive fern book which seems to cause contemporary cataloguers some problems. It has been assigned dates as far apart as 1840 and 1910. The first part of *European Ferns* by James Britten appeared in 1879 and the parts were issued monthly finishing in 1881 with part thirty. The full volume was issued in 1881 and the work was reissued in parts from 1883-1885. The book has thirty chromolithographed plates drawn by D. Blair and the early editions had a beautiful gilt blocked cover. Britten was, at the time, based at the British Museum and the book is a quite authoritative review of European ferns. It also includes a fascinating collection of myths and legends about the attributes of ferns. For some reason catalogues persist in labelling this book as scarce. In a three year survey I carried out it was the most frequently occurring of all fern books.

The last book to which I shall make specific reference is *Ferns and Fern Culture* by John Birkenhead. Although only a modest book, it is a mine of information and, with its woodcut illustrations, quite charming. It is notable for being written by the foremost grower of the late Victorian period. John Birkenhead and his brother William ran, in Sale, Cheshire, the largest ever fern nursery. The extent of their stock is most easily understood by reference to their very collectable large catalogues. The catalogue for 1888 lists over 2000 species and varieties of ferns.

This brief survey of Victorian fern books is, of course, rather selective and comprises only a part of the total range of books. Many of the others are not expensive and are well within the reach of the low budget collector. The avid fern book enthusiast is certainly not restricted to the areas dealt with here. During the same period a lot of books were being written by British authors that covered the ferns of other countries, particularly Commonwealth countries. Equally authors from other countries were writing books about ferns. The collector need not be restricted to books: fern albums and nurserymen's catalogues make an interesting group. Fern books continued to be published and indeed are being published today. The last fifteen years have seen a revival of popular interest in ferns particularly in Australia and the United States. This is reflected in the number of books being published in those countries. The numbers are currently equalling the quantities published in the 1850s. Clearly collectors will be kept busy for many years to come.

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WHICH BOOK?

MARTIN RICKARD

In recent years BPS Booksales has circulated with our literature, lists of fern books for sale. Of late the organiser of this service, Jimmy Dyce, has been increasingly successful in acquiring large numbers of new and secondhand books from all over the world. The result is an unrivalled selection of books on offer to tempt the keenest collector. For the beginner, however, the impact of the list is perhaps overwhelming ..... which book gives the best account of fern growing? Which book best describes the British ferns?, etc. etc.

Two articles published some time ago in the Newsletter, the forerunner of the Bulletin, described the principal fern books then published, together with some helpful comments on the various books. One by Jimmy Dyce gave an annotated list of some of the books in his collection (No. 5, 1967, app. 4), the other by Henry Schollick was "An Anatomy of a Pteridological Bibliomania" (No. 9, 1971, p. 20). Both of these items are strongly recommended but unfortunately neither of them is now readily available. The previous review by Nigel Hall is also of great value, but by being limited to Victorian fern books, it is only occasionally helpful to the newcomer. In this article therefore I give, what is of necessity, a personalised view of the books which stand out in each category.

Books for fern growers

Outstanding in this section is Reg Kaye's *Hardy Ferns* (1968). Extensive cultural notes are given together with fully anotated lists of British and exotic ferns and varieties hardy in the UK. For me this is a book to refer to or browse, safe in the knowledge that it is an authorative work written by some who really knows his ferns. Illustrations are good too although a few more would have been welcome! This book is still available and it is hard to believe that any fern grower can be without it. Other notable modern books which cover the same general ground are: *Ferns* (1980) again by Reg Kaye, a slim volume more or less abridged from *Hardy Ferns; Ferns* (1974) by Roger Grounds; and *Ferns for Garden and Greenhouse* (1971) by Philip Swindells.

Going back in time several other works deserve a mention. A.J. Macself's *Ferns for Garden and Greenhouse* (1952) is a very useful account largely superseded by Reg Kaye's book, but well worth getting when available. *British Ferns and their Varieties* (1910) by Charles Druery is obviously an older book but still *the best* for the specialist variety collector — mainly because it includes 98 nature prints of many of the classic varieties grown during the heyday of the fern grower. Druery wrote two other books — *Choice British Ferns* (1888) and *The Book of British Ferns* (no date, but published in 1903) which though lacking the nature prints are full of valuable information and also have the great advantage of being cheaper and easier to find! *British Ferns and where found* (1980) by E.J. Lowe is an extraordinary work, apparently published for the 'Young Collector', but it gives the fullest list of fern varieties ever published, a total of 1861 in all! Lowe also published *Out Native Ferns* (1862 etc.). This comes in two volumes and is very well produced with numerous full page colour plates. In its time it was an important book but unfortunately many of the varieties are not considered worth keeping these days. Coverage of the good class varieties is better achieved in the slightly more recent Druery book, *British Ferns and their Varieties,* mentioned above.

Looking to the future Richard Rush's *Hardy Ferns* deserves mention. It will be published this spring by the Society and from what I have seen of the copy I expect it to be the most comprehensive guide to exotic hardy ferns ever published.

Additional information on fern growing in the United Kingdom will be found in many other books but the above will be a very good start — when available!

Non-British books on fern growing are relatively scarce — at least on the British market. Two which stand out are both American. One, Foster's *The Gardener's Fern Book* (1964) (renamed *Ferns to Know and Grow* in later editions (1971, 1976)) gives a double page spread for each selected fern considered suitable for cultivation in North America. Hardy and Non-hardy ferns are covered. The other, *The Fern Grower's Manual* (1975) by Hoshizaki is a very comprehensive work, giving cultural details for hundreds of fern taxa cultivated in America. It is unlikely that the novice fern grower will need this book, but for the specialist it contains vast amounts of readily extractable information not available elsewhere.

While not strictly speaking a book, I cannot complete this section without mentioning one of the best sources of random information on this subject, i.e. the first eight volumes of our *British Fern Gazette*.

Fern floras

Worldwide, hundreds of books on ferns of a country or region have been published. In some cases a country has been written about many times. For example, I can think of well over 30 books on the ferns of the British Isles. Many of these are little more than re-mixes of earlier volumes but there are a number which stand out. Edward Newman's *History of British Ferns,* especially the 1844 and 1854 editions, are full of useful information — apart from many of the names much of it is still amazingly accurate. Despite its age this book is still fairly frequently available. Contemporary with Newman was Thomas Moore; he wrote many fern books but the best for the real collector are the octavo (1859) and folio (1855) editions of his *Nature Printed British Ferns*. They are very expensive but I doubt if any possessor of either work regrets the expense. It took about 100 years to significantly improve on these Victorian volumes. However, in the last few years C.N. Page's book *The Ferns of Britain and Ireland* (1982) and the sixth edition of *Welsh Ferns* (1978) by Hyde, Wade and Harrison have brought publication on the British ferns up to date. Both books are recommended; *Welsh Ferns* is a concise, very reasonably priced, account of Welsh ferns with briefer notes on the othe British species. Page's book, while unfortunately less reasonably priced, does give a very comprehensive account of all the British species. Fern books of other lands are less numerous and as an Englishman it is perhaps presumptious of me to pass judgement on them. However some stand out as being of particular value. For example, J.T. Mickel's *How to Know the Ferns and Fern Allies* (1979) seems the best account of the ferns of the U.S.A.

Books for house fern growers

Over the last few years several glossy 'coffee table' books dealing largely with ferns as house plants have appeared. These are mostly a pleasure to browse but tend to have a fair smattering of errors. I find *Ferns for Modern Living* (1977) by Elaine Davenport the most useful because it not only has excellent colour photographs but it also gives full instructions on cultural requirements. *Ferns from Mother Nature* (1977) by J.E. Gick is also a good buy.

Specialist books

It is perhaps worth briefly mentioning such books although most are outside the scope of this article as, by definition, they are not for the beginner. Fortunately, in most cases, the titles are more or less self explanatory, e.g. *Feasting on Fiddleheads* (no date) by Mickel — cooking with ferns; *The Genus Polypodium in Cultivation* (1982) by B.J. Hoshizaki; *The Victorian Fern Craze* (1969) by Allen — a fascinating historical view of pteridology; *Atlas of Ferns of the British Isles* (1978) by Clive Jermy et al — distribution maps; and various nurserymen's catalogues.

Any beginner buying all the books recommended here would very quickly cease to be a beginner! However, I hope these notes will help make the first purchase a useful one.

THOUGHTS ON GROWING FERNS FROM SPORES

A.R. BUSBY

Raising ferns from spores is such a fundamental part of fern growing that it cannot be considered too often. Each year, new members are faced with the same problems, so let us consider what we can do to overcome the more common pitfalls.

Our first requirement is fresh spores. It is always better to use fresh, ripe spores straight from the plant, especially for those species that produce green spores, e.g. *Hymenophyllum, Osmunda,* etc. This is not always possible, however, and spores from an exchange scheme which are unlikely to be fresh may have to be used. Much of the enjoyment in fern growing is sowing spores from such schemes on the chance of raising something interesting. Remember that fern spores are microscopic and carried long distances in the air. They persist in the air for hours, they do not fall to the earth like lead pellets but sink very slowly. Supposing we sow a packet of spores, put the pot on one side and prepare another pot for sowing. While we are doing this, spores from the first sowing are persisting in the air near us. Now we sow another species in the second pot and it is also invaded by the spores in the air. And so it goes on until we could have 4 or 5 species in the 5th or 6th pot. This is illustrated by my article on *Dicksonia x lathamii,* published elsewhere in this journal, where chance spore contamination lead to the development of this hybrid tree fern.

A suitable compost

Proprietary composts such as the soil-less types (e.g. Fisons, Levington and Arthur Bowers) or the loam-based John Innes Seed Composts can be used; however many fern growers prefer to make up their own sowing compost. I have had excellent results using the following mix: $\frac{1}{3}$ part peat, $\frac{1}{3}$ part sphagum moss which has been passed through a $\frac{1}{4}$ inch sieve and $\frac{1}{3}$ part sharp sand; all parts by volume. I use a 5 inch pot as a volumetric measure. To the above mix I add a handful of charcoal.

Please note that I have not included any fertiliser so the prothalli may begin to look rather yellow-green and anaemic, especially if they are left to grow on in the sowing mix for several months. Such side effects due to the lack of fertiliser are easily remedied by the application of a foliar feed at half strength. Within hours, the prothalli will become a deep healthy green. A compound fertiliser such as VITAX Q4 could be included when the compost is mixed but because ideally, the prothalli will not be on the sowing mix very long, I consider it unnecessary.

Pots

Prothalli possess fine root-like hairs called 'rhizoids' that anchor them down to the soil and assist with the uptake of moisture from the soil. They are rarely more than 1-2cm long, so a depth of compost which is more than 4cm deep is unnecessary and wasteful. On the other hand, a very small volume of soil will tend to dry out quickly. An even balance has to be achieved between depth of compost and surface area. I use polypropylene pots, $2\frac{3}{4}$ inch square giving a soil dpeth of 4cm. I find them the perfect sizee and they can be steam sterilised. However, you can use other containers such as margarine tubs.

Cleanliness

In nature, fern spores and prothalli are constantly under threat. Their high mortality rate is due to the depredations of insects feeding on them, to unsuitable substrates and inclement seasons. By sowing the spores in clean compost, protecting them from pests and diseases and ensuring shade and moisture we remove the threats and should be able to obtain 100% success.

Let us consider removing two major threats to the spore sowings. The first is pests and diseases from the pots and soil. The simplest way is to fill your pots (hopefully, they have been scrubbed clean) with the sowing compost, cover the surface of the compost with a piece of paper and pour on a kettle full of boiling water, until the water pours from the drainage holes at near boiling point. When cool, remove the paper and sow your spores on the sterile surface. This is a time honoured way of preparing a sterile surface but it has to be admitted that the chances of obtaining a truly sterile surface this way is remote. Many algae and fungal spores will survive that treatment because the temperature obtained is not high enough or prolonged enough to kill them. Even if you have managed to obtain a sterile surface, as soon as the compost cools, it will be invaded by more unwanted spores unless it is kept covered. The second problem is troublesome weeds which invade our sowings and crowd them out. Moss plants can be picked carefully off the surface taking care not to disturb the prothalli. Although filamentous green algae can occur on the surface of the compost, what is usually encountered is moss protonema. This is a thick green mat of threads which can persist in this form for months while budding off moss shoots from time to time. This is a real destroyer of spore sowings and although you may attempt to remove it, any tiny fragments left behind will regenerate into a thick mat again.

Liverworts can also be removed in this way but are tiresome to handle and any tiny fragments left behind will also develop into large plants again.

Let us consider another method that ensures greater freedom from the troubles already described. For this you will require clay or polypropylene pots. Make up the sowing compost and fill the pots in the normal way. Make sure the compost is moist. Place the pots into a plastic oven bag leaving the mouth of the bag untied. Now place the bag into a domestic pressure cooker with the recommended quantity of water. Cook at 15 psi for 15 minutes. As soon as the pots are done, release the pressure from the cooker in the usual way. Remove the lid and quickly seal the bag making it airtight. The contents are absolutely sterile and will remain that way until the bag is opened again. Obviously, the bag will have to be opened to sow the spores but remove the pots quickly, one at a time and keep the bag sealed. When all the pots are sown and back in the bag, seal the bag making it airtight. They will not require any attention for several weeks. Remember, once you have opened the bag, sterility is gone and every time you open the bag, you allow more spores to invade your sowings.

Pricking out and potting on

Now let's move on to several weeks later and your sowings are a thick, healthy carpet of fern prothalli. It's always difficult to avoid sowing spores too thickly, and crowded prothalli tends to arrest development. To make sure they continue to develop, we must prick out the prothalli into fresh compost in seed trays. Do not attempt to prick them out singularly but prick them out in small clumps as you would with bedding Lobelia. If you have raised your prothalli in a closed case or bag, difficulties arise when they are brought into a dryer atmosphere, due to the soft growth that is encouraged by the warm, moist conditions. Carefully wean the sporelings to the dryer atmosphere. Once your sporelings gain some size, say with 3-4 fronds, they will be less vulnerable. They can be potted on into 3 inch pots using an ordinary potting compost. With hardy ferns, it is much better to get them planted out in a nursery bed, in the garden, by the second season. They will develop much faster than being restricted in pots. Any sheltered, shady corner of the garden can be used as a nursery bed.

Very soon, you will be planting the best of the ferns into your own borders and swapping or giving away the surplus to other members.

A 'FERN' AT BREAKFAST TIME

A R BUSBY

My mornings usually begin at 6.15 a.m. with one eye on the morning paper, one eye on BBC Television's 'Breakfast Time' and a cup of coffee in my hand to gently bring me out of my sleepy stupor. One morning, during October 1983, as my attention passed from page 3 to page 4, I heard the distant voice of Frank Bough, presenter of 'Breakfast Time', introduce an item on unusual Christian names, and he asked his co-presenter, Miss Fern Britton, how she came by hers. Miss Britton replied that she was named 'Fern' because a great grandfather of hers was a 'fern breeder'.

You can imagine how those words galvanised my attention to the television screen! Dropping my morning paper into the waste paper bin, I hurriedly checked the Society's 1982 membership list for a 'Mr Britton'. No such name appeared, so I checked the 1920 and 1930 lists. Still no 'Mr Britton' appeared. All that day I could not get the mysterious 'fern breeder' out of my mind, so I wrote to Miss Britton asking for further details of her great grandfather.

In due course, Miss Britton kindly replied to tell me that her fern-growing great grandfather was Canon Hawkins of Stroud in Gloucestershire, and that she would be very interested if I had any information about him.

I was pleased to be able to supply her with the following information gleaned from the minute book and back-numbers of the *British Fern Gazette*.

The Rev. E. H. Hawkins, M.A., was elected to the Society at the 18th Annual General Meeting at Kendal on August 2nd 1909. He remained an active member of the Society until June 1936, when due to ill-health he resigned his membership. In the December of that year, he was elected an Honorary Member (an indication that the Society held him in great esteem). At the outbreak of war, the Society's activities were suspended. When the *British Fern Gazette* reappeared in July 1948 Canon Hawkins' name was missing from the membership list.

As far as I know none of the reverend gentlemen's fern varieties are certainly still in cultivation (but see *Bulletin* 1982 Vol. 2 No. 4 p. 196-197), but it is pleasing to note that his fern interest is celebrated in a 'Fern' of today.

DID YOU KNOW?

A fully-grown soriferous plant of the Lady Fern, Male Fern or Soft Shield Fern can produce up to and over ONE THOUSAND MILLION spores in one season. (See extract from the writings of C.T. Druery in the 1983 Bulletin, Vol. 2 No. 5).

J. W. DYCE

THE HISTORY OF DICKIE'S FERN IN KINCARDINESHIRE

PETER MARREN
NCC, Foxhold House, Thornford Road, Crookham Common, Newbury

ABSTRACT

An account, based on literature sources, of the discovery and status of the fern *Cystopteris dickieana* in its type locality and of its reported extirpation only twelve years after being first brought to public notice in 1848. The present-day status of this rare fern is reviewed.

> 'Having been the first to distribute specimens in a living state, among cultivars, my name has been associated with this singular variety. It was, however, no original discovery of mine, the late Professor Knight having been in the habit of showing it to his pupils. It is now completely extirpated .....'
>
> *George Dickie, 1860*

Dickie's Fern, *Cystopteris dickieana* is one of the less well-known British ferns, and perhaps one which many British pteridologists may not have seen in the wild although the species is widely cultivated. The type locality of the species lies in a sea-cave near Aberdeen, on the Kincardineshire coast. Here it is a distinct and attractive fern, bearing broad, overlapping pinnae which are slightly twisted on the rachis, a characteristic feature which tends to be lost in preserved herbarium specimens although it is maintained in cultivation. Since its discovery, a fern attributed to *C. dickieana* has been found sparsely but widely in Europe and in two or three places elsewhere in Britain. This fern shares the mainly knobbly, non-spiny spores of the type material but in most cases lacks its distinctive overall appearance. The spore characters, which separate the species from *C. fragilis,* need further investigation. Spiny spores have been found even in this type locality (Mrs. Etta Sommerville, *pers. comm.*). Page (1982) suggests that the type locality may house a relatively 'pure' genetic form of *C. dickieana,* whereas other reported Scottish (and European?) forms may be partially introgressed with *C. fragilis.* If so, the 'pure' Kincardineshire *C. dickieana* may be of sufficient international rarity to justify its official status as 'endangered' and its inclusion as a protected species in Britain under schedule 7 of the Wildlife and Countryside Act (1981).

The British localities of *Cystopteris dickieana* lie within about seven kilometres of rugged coast in northern Kincardineshire. The cliffs are complex metamorphosed rocks of Dalradian age, sometimes capped with till and characterised by sea-caves and narrow inlets known locally as 'yawns'. Near Aberdeen there has been some recent disturbance from rubbish dumping and reinstatement, but in general the wild character of this area has been preserved despite the North Sea oil-related developments situated not far away. Since the discovery of *C. dickieana* in the 1830s, about four sites have been found, although only two appear to have been visited in recent years. Two of these sites are in dripping sea-caves and the others are on overhanging rocks. Since there is much potential *C. dickieana* habitat accessible only by boat, the fern may well occur in other places which have not been explored by botanists.

The type locality is an east facing sea-cave fronted by a pebble beach in the shelter of a small bay. This cave was probably once used for the storage of creels and other fishing gear of an old-established neighbouring settlement. The Kincardineshire sea-caves

attracted visitors as long ago as 1838, when the parish minister of the day wrote:

> 'In the neighbourhood of this place there is a cave entering from the sea, several yards inland, and terminating in a beach, and covered in solid rock. In the rocks, along the coast, there are several of these caverns or excavations, arched in a very wonderful manner, and running a great way underground.'
>
> (NSA)

It seems however that the minister had no knowledge of ferns and indeed had little to say about the local flora beyond a remark that the area was suitable for growing artichokes!

The rocks of the 'type cave' appear to be gneiss with bands of quartz, although garnet-mica-schist and a variety of minerals including andalusite and sillimanite occur in the near vicinity. These rocks weather readily to form a moderately calcareous, reddish soil, supporting plants such as *Geranium sanguineum, Astragalus danicus, Helianthemum chamaecistus* and *Koeleria cristata.* The cave itself is normally dripping wet except in hot weather, and *C. dickieana* grows in deep shade, centred on a fissure across the cave roof. Apart from a clump of nettle on the site of a gull's nest, there are few flowering plants in the cave, and our fern's main associates are *Asplenium marinum* and *Athyrium filix-femina.* From a short distance the cave has a dramatic and slightly sinister appearance (which may be well justified if the visitor happens to misjudge the tide). The general effect is spoiled when, as occasionally happens, a local philistine tips a lorryload of household rubbish down the cliff.

Cystopteris dickieana was not named and described in a printed journal until 1848, but by then the presence of an unusual fern in one of the Kincardine caves had been known to Aberdeen botanists for at least a decade. The original discoverer, according to George Dickie (1860), was William Knight (1786-1844), a forceful and sardonic Professor of Natural Philosphy at Marischal College, Aberdeen. Although botany was then a very minor subject in the natural philosophy curriculum, Knight took a keen interest in plants and by organising and leading private field classes, "did essential service in diffusing a taste for botanic pursuits." The rocky coast south of Aberdeen was a popular location for field outings from the late 1830s onwards. Not only Knight but other well known north eastern naturalists like James Nicol and William MacGillivray trod the beaten track from the Aberdeen colleges across the windy headland of Girdleness to the secluded coastal fishing bothies and caves. Under the direction of these masters, pupils were expected to examine, collect and classify examples of the wide variety of rocks, plants and shore life. The pupils probably enjoyed these collecting trips. John Michie, later a parish minister and an avid antiquarian, recalled pleasant memories of Saturday excursions to the Kincardine sea coast in 1853 where he and his fellows spent many hours "collecting specimens and enjoying free intercourse with each other" (Michie, 1908). In consequence, the short stretch of coastline which included the *dickieana* was by 1860 among the most minutely documented — and heavily collected — places in north east Scotland.

The earliest published reference to *C. dickieana* was made in the first of Dickie's three floras, *Flora Abredonensis* (1838). Against the entry for *Cistopteris (sic) fragilis,* he writes: *"in a coastal cave ... rare,"* and, elsewhere, *"Asplenium marinum ...* and *Cistopteris fragilis* (are) found in moist caves on the coast." Since *C. fragilis sensu recens* has never been recorded from this area, it is clear that *'C. fragilis'* was none other than the fern which would later bear Dickie's own name. This is confirmed by P.H. MacGillivray's *Catalogue of the Flowering Plants and Ferns growing in the neighbourhood of Aberdeen* (1853) which lists the fern's correct name against the same locality. Since Dickie himself was one of Professor Knight's pupils, he was probably one of those to whom the fern was shown, some time before 1838. By 1839, when he was appointed lecturer at King's College, Aberdeen, Dr Dickie already had a reputation as an acute and critical systematic

botanist. He may already have cultivated the strange cave fern and realised that it was a new and distinctive variety if not a separate species. Accordingly, he began to distribute living material to the leading pteridologists of the day. The type collection, gathered by Dickie in 1842, now resides in the herbaria of the British Museum (Natural History) and the Royal Botanic Gardens at Kew. The holotype is labelled retrospectively in Dickie's own handwriting, *'C. fragilis var Dickieana*. Sea cave near Aberdeen. 1842.' Dickie's later *Botanist's Guide* of 1860 allows the location of this sea cave to be pin-pointed with certainty. Other material either collected or cultivated by Dickie dates from 1843, 1846 and 1850. Those who received living material included Thomas Moore and Edward Newman, both authors of well-known contemporary textbooks on ferns.

One of the first nurserymen to receive the fern was Robert Sim (1791-1878) of Foots Cray, Kent. In a short paper in the Gardener's and Farmer's Journal for 1848, Sim published a description of the fern (including the appearance of the spores) under a new taxon, *Cystopteris fragilis var Dickieana,* adding that "if any of the recorded species of *Cystopteris* apart from *C. fragilis* have a claim to rank as such, so also must *C. Dickieana*." It is worth noting that Sim was aware that the fern had first been discovered by Knight and not by Dickie. We must assume that he decided on 'Dickieana' rather than 'Knightiana' because it was Dickie who, realising the fern's true status, was the first to bring it to the attention of a wider scientific public. Curiously enough, Dickie had also discovered a diatom new to science during the course of his visits to the cave, which was named *Orthosira dickieii*. Thus this shy, methodical man was granted the singular distinction of two eponymous plants from the same cave. Sim's note was followed by a communication from the celebrated Thomas Moore in The Botanical Gazette (1849). Moore, who had received living material of the fern from Dickie in 1846 and had thereafter maintained it in cultivation, was inclined to agree with Sim that *dickieana* merited specific rank. However, he decided to play safe and listed it as a mere variety of *C. fragilis* in the next edition of his *Handbook of British Ferns* (1849) which included the first figure of the fern. Wider publicity followed. C.C. Babington included it in his *Manual of Botany* (1851) as *Cystopteris dentata forma Dickieana* and later editions of Newman's *British Ferns* and new fern books like Moore and Lindley's *Nature Printed Ferns of Great Britain and Ireland* gave the new variety prominent place.

C. dickieana, then, was becoming known to the fern growing public by the early 1850s. This was, of course, the time when the middle class Victorian craze for ferns was approaching its height (Allen, 1969). Although there is no evidence that fern gathering was popular in Aberdeen outside academic circles (the Royal Fern, for instance, survived on a crag not far from the *dickieana* cave throughout these years), *dickieana* was bound to attract the attentions of professional dealers and nurserymen from further afield It does appear that a brief period of indiscriminate collecting in the 1850s by visiting nurserymen and local field botanists did almost exterminate the fern in its best known station, the type locality. The evidence that *dickieana* nearly became a victim of the fern craze is largely circumstantial. As a new variety, it must have been in demand, for most of the commercial nurserymen eventually listed it in their catalogues. Its beauty was also awarded high priase by contemporaries. Moore called it 'the most decided Variety (of *C. fragilis*) yet known', while James Backhouse, to whom we shall return, described the wild fern as 'striking and beautiful'. Shirley Hibberd paid it the compliment of placing its portrait on the frontispiece of his *Fern Garden* (1869), adding that 'with one exception, the varieties (of *C. fragilis*) are worthless, but *Dickieana* makes amends for all ' Neither was there any attempt to maintain the slightest secrecy over its best known location; on the contrary, pteridologists were at pains to identify the site as accurately as possible. By 1858, a local botanist and pupil of Dickie's, W. Sutherland, was moved to write, *'Var. Dickieana* (occurs) at two or three places on the seacoast near Aberdeen. In one at least of

these places it has been almost extirpated, and that was the situation where the most typical specimens were got; in other places there is a tendency to become identical with *var. dentata.'*

Sutherland, it should be noted, was not above the fashionable trend himself. 'Excelsior be your cry', he proclaims in the same article, 'and the filling of your vasculum with the rarity your object.'

In his *Botanist's Guide to the Counties of Aberdeen, Banff and Kincardine,* published two years later, Dickie states that his fern had been 'completely extirpated' from the type locality. One possible reason for this sudden decline is provided by C. Barter (1856) who was 'much disappointed to find the cave fallen in considerably and the few plants remaining very small'. The fern was present in greater quantity in the early 1850s when it was collected, probably heavily, by a number of botanists and nurserymen. James Backhouse the younger visited the cave in 1852:

"I have *(dickieana)* in cultivation", he wrote in a letter to *The Phytologist,* after first describing the cave and outlining his views on the nature of the new variety. We do not know how many plants he removed, but he managed to fill several herbarium sheets which still survive and had enough living material left over to cultivate a commercial supply in his glasshouses. In 1857, he possessed a sufficient stock of Scottish *dickieana* to offer it in his catalogue at 3s. 6d. per plant — not a large sum compared with the half guineas being lavished on choice rarities like the *Woodsias* or *Trichomanes speciosum.*

Even so, Backhouse was soon being underpriced by rival nurserymen such as Sim (1859: 2s. 6d.) and Stansfield (1858: 1s. Od. — surely a great bargain) who had likewise amassed quantities of the fern. By the mid-1860s, the going rate for *dickieana* had dropped to a paltry 1s. Od. to 1s. 6d. The demand, if such there was, appears to have been satiated remarkably quickly. The reason was probably the ease by which the fern could be propagated in cultivation. In later editions of his popular *British Ferns,* Edward Newman commented that "it is a perfectly healthy plant, not monstrous or distorted, and it produces its like from seeds for many generations, becoming a perfect weed, whereas *fragilis,* under similar treatment, rarely reproduces itself." Shirley Hibberd's *Fern Garden* gave detailed instructions on how to cultivate *dickieana* which was a straightforward enough job providing slugs and snails were kept at bay ("They must be trapped and destroyed with energy; you must be a Thug to such people"). Early material of *dickieana* has been maintained in cultivation to this day (Page, 1982). The ease by which it can be cultivated probably saved *C. dickieana* from extinction in Kincardineshire, for there was little incentive for nurserymen to loot the remaining wild population after 1860.

Was Dickie correct in asserting that *dickieana* had been completely extirpated from its type locality by 1860? We can be reasonably sure that it had become very rare since we have the corroborative evidence of Sutherland (1858) and Professor James Trail, who regarded it as 'almost extinct' (Trail, 1923). On the other hand, there exists herbarium material from 1871, 1879, 1886 and 1893, whose labels suggest that the ferns were gathered from the type locality. And since *dickieana* is happily still with us in its original cave, there would seem to be only two possibilities (barring a deliberate reintroduction, for which there is no evidence); either the fern recolonised the cave from one of its other localities or Dickie was mistaken.

A natural recolonisation within a dozen years of the fern's extirpation is presumably feasible, although the nearest known station is separated from the type locality by a rocky headland and there the fern is said to be morphologically dissimilar from the type and closer to *C. fragilis.* In favour of Dickie being mistaken, there is this to say: From 1850 to 1860, Dickie chaired the department of Natural History in Belfast, and his opportunities

for visiting his native burgh were limited during this time. After his succession to the new chair of Natural History in Aberdeen in May 1860, he would have been unusually busy organising the new curriculum and running his department; we might presume that his fieldwork was severely curtailed for a time. After the conclusion of the first class session, he took a party of his students on a botanical tour of Ben Macdui and Cairngorm, where he contracted severe bronchitis and never fully recovered. His *Botanist's Guide,* published that same year, was compiled mostly from material gathered many years earlier or from the records of pupils and friends. His statement on the demise of *dickieana* may not therefore be first hand. One is reminded of the old adage:

> Somebody told me that someone said
> That some other person had somewhere read
> In some newspaper that you were somehow dead!

The sparse, inconclusive record suggests that *C. dickieana* did survive in its original station in very small quantity. G.C. Druce evidently found the fern there in 1886, but was unable to do so in 1918. The majority of botanists have always visited this one relatively accessible site to pay their respects to the fern. The other localities are not often visited and even their number is uncertain. They are as follows:

1) 'A dripping cave ... about half a mile north (of the type locality) ... I have known it there during the last fifteen years' (Dickie, 1960).

2) From 'micaceous rocks' about three kilometres south of Aberdeen harbour (Barter, 1856).

'Here by a small rill that fell over the rocks, I managed to creep down and was gratified to find *Cystopteris* in profusion. It is growing on rocks which overhang, so that the plants are much sheltered. I gathered fronds of *C. dickieana* here from six to eight inches long ... From the luxuriant specimens gathered here, and the abundance of plants noticed, I presume no ruthless hand had been plant-gathering here of late, whilst the difficulty of reaching the spot will always afford it protection from invaders, excepting perhaps those affected with the Fern-mania. I filled my box with plants and fronds, leaving abundance for those who choose to follow by venturing the same road.'

3) On underhanging rocks half way up the cliffs, about two kilometres north of the type locality (Mrs Sommerville pers. comm. c. mid-1950s).

4) A station north of the type locality where it occurs in profusion (Druce, 1919). The editor of the British Fern Gazette claimed that Druce had found the fern 'in several places' (Rowlands, 1929) although he must have been in error when he claimed that these included Aberdeenshire as well as Kincardineshire. Druce's sites may have been the same as (1), (2) or (3).

Such is the curious, chequered history of *C. dickieana* in Kincardineshire. The record suggests that the original site was over-collected during the 1850s by commercial nurserymen and by successive student botanists who were encouraged to collect in the area. An underlying cause for the fluctuating fortunes of the fern may be that occasional rock-falls and changes in the microclimate of the cave, particularly humidity, serve to regulate the fern's numbers and fertility.

One intriguing possibility, which could go some way to explain why *C. dickieana* was so slow to recover after 1860, is that the fern appears to have been less fertile in the nineteenth century. In 1852, Backhouse observed that 'the Cystopteris is generally

without fructification' and most nineteenth century herbarium material appears to be sterile. This contrasts markedly with the abundance of sporelings and fertile fronds found in most recent years. After the relatively dry summer of 1982, c. 130 sporelings and c. 190 mature plants were counted, and in 1958, evidently a favourable year, no less than 1000 sporelings and 470 mature plants appeared (Chater, pers. comm.). In 1958, the cave was dripping wet and conditions of high humidity may favour the fern's reproductive capacity. By contrast a succession of hot summers, which the late nineteenth century sometimes enjoyed, might reduce the populations numbers and overall fertility, and be capable of retarding its recovery from a low ebb. After the hot summers of 1975 and 1976, the fern's numbers were relatively low, except in the dark crevice along the roof of the cave. The population has never sunk to a dangerous level within living memory, however, and its survival prospects would appear to be favourable: there is currently a healthy, regenerating population and one which lies mostly out of reach of human hand; there are no discernable "threats" to the sites and the recent designation of the plant as a protected species may serve to focus more attention on the status of this little-known species.

Note: Because of the rarity of Dickie's Fern, I have slightly abridged a few quotations which localise its site more closely than is, perhaps, advisable.

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FERN NOMENCLATURE — OLD AND NEW

J. W. DYCE

Letters continue to reach me from members complaining about difficulties with fern naming, and the confusion arising from the frequent name changes. They are unable to reconcile today's names with those appearing in old fern books acquired from various sources.

In 1970, in our *Newsletter* No. 8 (the precursor of our present *Bulletin*), I published, under the same heading as above, a list of all our latest fern names along with the older ones. Since then there have been many more changes, and it is time to re-publish the list, bringing it up-to-date.

I repeat what I said in 1970 that I have not delved deeply for *very early* names which are of botanical interest only, and do not affect growers and other members working from both the old books and more recent ones.

ADIANTUM CAPILLUS-VENERIS — Maidenhair Fern

ANOGRAMMA LEPTOPHYLLA — Jersey Fern, Slender-leaved Gymnogram
Gymnogramme leptophylla

ASPLENIUM ADIANTUM-NIGRUM — Black Spleenwort
Subspecies: A. ADIANTUM-NIGRUM ONOPTERIS, A. ADIANTUM-NIGRUM ADIANTUM-NIGRUM

A. X ALTERNIFOLIUM — Alternate-leaved Spleenwort
A. x breynii
A. x germanicum

A. BILLOTII — Lanceolate Spleenwort
A. lanceolatum
A. obovatum

A. CETERACH — Rusty-back Fern
Ceterach officinarum

A. FONTANUM — Smooth Rock Spleenwort

A. MARINUM — Sea Spleenwort

A. RUTA-MURARIA — Wall Rue

A. SCOLOPENDRIUM — Hart's-tongue Fern
Phyllitis scolopendrium
Scolopendrium vulgare

A. SEPTENTRIONALE — Forked Spleenwort

A. TRICHOMANES — Maidenhair Spleenwort
Subspecies: A. TRICHOMANES TRICHOMANES, A. TRICHOMANES QUADRIVALENS

A. VIRIDE — Green Spleenwort

ATHYRIUM DISTENTIFOLIUM — Alpine Lady Fern
A. alpestre
Polypodium alpestre
Pseudo-athyrium alpestre

A. FILIX-FEMINA — Lady Fern

A. FLEXILE
Polypodium flexile

BLECHNUM SPICANT — Hard Fern
Lomaria spicant

BOTRYCHIUM LUNARIA — Moonwort

CRYPTOGRAMMA CRISPA — Parsley Fern
Allosorus crispus

CYSTOPTERIS ALPINA — Alpine Bladder Fern
C. regia
C. DICKIEANA
C. FRAGILIS — Brittle Bladder Fern
C. dentata
C. MONTANA — Mountain Bladder Fern
DRYOPTERIS — Buckler Ferns
Lastrea
Nephrodium
D. AEMULA — Hay-scented Buckler Fern
Lastrea foenisecii
L. recurva
D. AFFINIS — Scaly Male Fern.
Subspecies: D. AFFINIS AFFINIS, D. AFFINIS BORRERI, D. AFFINIS RUBUSTA.
D. AFFINIS STILLUPPENSIS
D. borreri
D. pseudomas
Lastrea paleacea
L. pseudomas
D. CARTHUSIANA — Narrow Buckler Fern
D. lanceolato-cristata
D. spinulosa
Lastrea spinulosa
D. CRISTATA — Crested Buckler Fern
Lastrea cristata
D. DILATATA — Broad Buckler Fern
D. austriaca
Lastrea dilatata
D. EXPANSA — Alpine Buckler Fern
D. assimilis
Lastrea dilatata alpina
D. FILIX-MAS — Male Fern
Lastrea filix-mas
D. OREADES — Dwarf Male Fern
D. abbreviata
Lastrea propinqua
D. X ULIGINOSA
Lastrea uliginosa
D. SUBMONTANA — Rigid Buckler Fern
D. villarii
Lastrea rigida
GYMNOCARPIUM DRYOPTERIS — Oak Fern
Dryopteris linnaeana
Lastrea dryopteris
Phegopteris dryopteris
Polypodium dryopteris
Thelypteris dryopteris
G. ROBERTIANUM — Limestone Fern, Limestone Polypody
Polypody robertianum
P. calcareum
Thelypteris calcareum

HYMENOPHYLLUM TUNBRIGENSE — Tunbridge Filmy Fern
H. WILSONII — Wilson's Filmy Fern
H. unilaterale
H. peltatum
OPHIOGLOSSUM LUSITANICUM — Dwarf Adder's Tongue
O. VULGATUM — Adder's Tongue
Subspecies: O. VULGATUM VULGATUM, O. VULGATUM AMBIGUUM
OREOPTERIS LIMBOSPERMA — Mountain Fern, Mountain Buckler Fern
Dryopteris montana
D. oreopteris
Lastrea montana
Thelypteris limbosperma
T. oreopteris
OSMUNDA REGALIS — Royal Fern
PHEGOPTERIS CONNECTILIS — Beech Fern
Dryopteris phegopteris
Gymnocarpium phegopteris
Lastrea phegopteris
Polypodium phegopteris
Thelypteris phegopteris
Phegopteris polypodioides
P. vulgaris
PILULARIA GLOBULIFERA — Pillwort
POLYPODIUM VULGARE — Common Polypody
An aggregate of three species —
P. AUSTRALE — Southern Polypody
P. INTERJECTUM — Intermediate Polypody
P. VULGARE (sensu stricto) — Common Polypody
POLYSTICHUM ACULEATUM — Hard Shield Fern
P. lobatum
P. LONCHITIS — Holly Fern
P. SETIFERUM — Soft Shield Fern
P. angulare
PTERIDIUM AQUILINUM — Bracken
Pteris aquilina
THELYPTERIS PALUSTRIS — Marsh Fern
T. palustris Subspecies: glabra
Dryopteris thelypteris
Lastrea thelypteris
L. palustre
TRICHOMANES SPECIOSUM — Killarney Fern, Bristle Fern
T. radicans
WOODSIA ALPINA — Alpina Woodsia
W. hyperborea
W. ILVENSIS — Oblong Woodsia

MR HENWOOD'S POLYPODY COLLECTION

MARTIN RICKARD

While recently hunting through the Society's odds and ends at the British Museum (Natural History), I came across this photograph of T.E. Henwood's polypodium collection. Henwood's polypods were famous early this century and presumably this photograph was intended as a frontispiece of the *British Fern Gazette* to complement the article describing the collection (See *British Fern Gazette*, Vol.2, pp.224-227 (1914)). Perhaps it was not used because the priority at the time was to illustrate some of the many new varieties being raised.

As a pteridologist with particular interest in polypods, I find this photograph full of interest, especially when examined in tandem with Henwood's account. Although the original text is too long to reprint in full, I can, perhaps, point out one or two of the more obvious varieties: *P. australe* 'Cambricum' is in the left foreground, while at the right by the edge of the bench is *P. vulgare* 'Trichomanoides Backhouse'. A small plant next door but one behind this looks like the legendary *P. australe* 'Grandiceps Parker' (any knowledge of the continued existence of this would be most welcome!) Large at the back are 'Pulcherrimum', 'Omnilacerum' and 'Semilacerum' forms. Half way along the front of the bench is a very crisped form, presumably one of the 'Cambricums'. Just slightly below dead centre, partially covered by a frond of 'Omnilacerum' is a *P. australe* 'Cristatum' form. Other forms can be picked out and names sometimes deduced or confirmed by reference to the original description.

In the original *Gazette* article useful notes on polypodium cultivation are given, briefly Mr Henwood suggests:

1) Never let them dry out — keep soil moist not sodden.
2) In spring and autumn give a good dressing of leaf mould (preferably oak) to which add a little bone meal. A warning note is added — be careful not to overdo the amount of bone meal!
3) For soil use loam, decayed leaves and old mortar rubbish with a fair sprinkling of bone dust, topped up with 4 inches of pure leaf mould.

Perhaps we should follow these guidelines, as the accompanying photograph is good evidence of the success of Mr Henwood's methods of cultivating polypods.

DID YOU KNOW?

Our most common fern is (no prizes for guessing this one!) — *Pteridium aquilinum.*

DID YOU KNOW?

Our most beautiful wild species (MY choice) is *Dryopteris aemula.*

DID YOU KNOW?

Our tallest fern, *Pteridium aquilinum,* can grow up to 12 feet, and more when it gets some support.

J. W. DYCE

Mr Henwood's polypodium collection, Reading c.1914

Equisetum x font-queri railway embankment. Evesham, Worcestershire

SOME OBSERVATIONS ON A COLONY OF EQUISETUM X FONT-QUERI

A. C. PIGOTT

The colony of *Equisetum x font-queri* Rothm. on a disused railway embankment near Evesham has been described by Roberts & Page (1979). Some further observations are presented here as a result of two visits to the site in June and July 1983.

The stand was found to be approximately 70m long, 1m wide on one side of the track and 2m wide on the other. The sides of the embankment are colonised by extensive stands of *Equisetum arvense L.* growing almost everywhere for several hundred metres. except where the *E. x font-queri* grows. Many of the shoots of *E. arvense* are very robust, approaching the size of *E. x font-queri.* No other *Equisetum* species were found up to nearly 2 Km north of the site along the embankment. The *E. x font-queri* grows amongst *Helictotrichon pubescens (Hudson) Pilger* as co-dominant species for most of the stand.

On the first visit (10 June) there were numerous cones, approximately one in twenty shoots being fertile. However, on the second visit (13 July) not one cone was observed. During the July visit measurements were taken of the height and shoot density of the stand. This was done by sampling at one metre intervals along the centre line of the colony on the widest side of the track. A wire ring of area 0.64m^2 was used, the density found by counting the shoots within the ring, and the height by measuring the shoot nearest to the centre of the ring. The mean height was found to be 0.63m with a standard deviation of 0.10m. One exceptional shoot was measured to be 1.10m high. The mean density was found to be 67.62 shoots m^{-2} with a standard deviation of 63.45 shoots m^{-2}. Taking the overall dimensions of the stand to be 70m x 3m, this gives the total number of shoots in the colony as 14200.

Reference

ROBERTS, R.H. & PAGE, C.N. 1979 *Fern Gaz.* 12 : 61-62.

SHORTER NOTE

Would a Plant Distribution Service Work?

Most raisers of spores, and I am no exception, inevitably grow more plants than they need, and the questions always arise: Can I give them away? Sell them? Put them on the compost heap? Exchange them? Well, ideally they should be distributed to those newcomers wishing to build up an "instant collection"; to those who for some reason cannot raise spores; and, in particular, to those who have plants to exchange in return.

If all our members or even institutions with surplus plants were to send full details to a central organiser, then lists of available species with addresses could be sent to people who had previously indicated their desire to obtain specific ferns. That part of the exercise would be one of information collation and reconciliation. The interested party could then communicate directly with the donor(s) concerned, sending a contribution for the postage, whereupon the distribution would be effected. Someone with expertise in sending plants through the post could perhaps advise on the best methods in terms of protection and survival, so necessary for small and delicate ferns.

Yes, I think it would work, and moreover, fulfill a useful function in supplying plants to those in most need. Any takers .....?

R. P. H. LAMB

ANOTHER TWELVE OF THE BEST FERN VARIETIES

J W DYCE

In the B.P.S. *Bulletin* for 1982 I published a list, with descriptions, of a dozen of our best fern varieties for the garden. I mentioned that they were a rather arbitrary choice from a list which must contain at least fifty names. Another selection from the list appears here, and they are known, from my long experience with them, to be good garden ferns, requiring little specialised attention.

Athyrium

Athyrium filix-femina 'Frizelliae'. This most unusual-shaped Lady Fern variety, known as the Tatting Fern, was found in Ireland in 1857 by Mrs Frizell and moved into a nearby garden where, I am assured by a visitor to the garden in recent years, the original plant is still growing strongly. The fronds are long and very narrow, up to about 12 inches or more, and a half-inch or less wide. The pinnae are tightly curled into flattened balls little more than a quarter-inch across, with the fan-shaped pinnules overlapping and piled up on top of each other. It breeds true, and over the years has become a section with many forms, ranging from tall to very dwarf, plus several crested ones with long open apical divisions and similarly-shaped curled pinnae. The fronds have been described by writers in the past as being like strings of green beads, a very apt description. It has one fault which, I am sure, must have been inherited from the original find, a tendency for the odd pinnae on the occasional frond to burst out into normal growth. The beauty of this gem is such that this flaw can be readiy overlooked. This fern grows happily in the fern border under normal fern conditions, and it does not seem to object to sunlight. It is possible, however, that too rich growing conditions may favour the tendency for the pinnae to "explode".

A.f. 'Setigerum'. This was an important and very distinct find, made in Lancashire in 1878. The pinnules are very deeply cut into spaced linear segments, tipped with fine, rather pale, bristles, hence the name 'Setigerum'. There is now a small section of progeny from this fern, and it is rather surprising that more has not been made of its possibilities which are great. Plants are available commercially and, as the setigerate quality is a dominant one, a collection of very good varieties can be built up from spore sowings. It is a strong upright grower, and a very handsome addition to the fern border.

Polystichum

Polystichum setiferum 'Divisilobum Bland'. Although known usually by this name, this variety is really the type plant of 'Plumoso-divisilobum'. Found in Ireland in 1910, it is recognised as the finest wild find of Divisilobum. It grows up to 2 feet, out-spreading, with large pinnae resembling small fronds, triangular in shape and overlapping. The pinnules are very long, more so on the lower sides of the pinnae, with narrow well-spaced pinnulets like small pinnules and themselves divided. It has a hardish crisp texture, and a very open and airy graceful habit. It is one of our most beautiful ferns, but although it produces bulbils generously they are rather stubborn to propagatge, so the variety is not as commonly grown as it should be.

P.s. 'Plumosum grande Moly'. This impressive variety was found in Dorset over 100 years ago, and is still with us, as upright and strong-growing as ever. It is completely barren — a *true* plumosum — and can only be propagated from offsets. Fortunately, it is not too mean with these, so the fern has got around, but it is not common in cultivation. It can grow up to 4 feet high with heavy broad fronds and wide overlapping pinnules on the large pinnae. The height and the weight of the fronds make it very susceptible to wind damage, and the very persistent fronds can be broken down by snow in winter. This is a most handsome and outstanding variety for the fern border.

Dryopteris

Dryopteris filix-mas 'Grandiceps Wills'. There are several good Grandiceps in cultivation, many of them not named, and quite good ones can be found occasionally in the wild. 'Grandiceps Wills' is one of the best, a strong grower, forming large clumps with

fronds over 2 feet high. The pinnae are spaced out, long and tapering, and end in neat well-balanced crests. The terminal crest is large, spreading and rather untidy. This fern, found by Wills in Dorset in 1870, is a rich-green in colour, very upright and outstanding, although it can appear rather coarse in appearance.

D. f-m. 'Linearis polydactyla'. This fern is one of the finest, if not *the* finest, of the *lineare* variations in cultivation, but its origin is obscure. The pinnules are hard in texture, rather lightish-green in colour, and are exceedingly narrow with no room to accommodate the very large round sori which project round their edges like beads. The terminal crests are long, narrow and many-fingered, and this also describes those on the long tapering pinnae. The fronds are about 3 feet high, sometimes upright but more often very straggling, giving a diffused rather misty appearance to the open clumps. Being a vigorous spreader, these quickly become large and handsome. As with all *lineares*, there is a slight tendency to become depauperate but this has to be looked for. This is a highly recommended fern and is not difficult to procure.

D. affinis (pseudomas) 'Angustata cristata'. This is one of our most beautiful fern varieties, and a handsome, very popular show fern. It was raised in the nursery of Sim of Foots Cray in Kent about 100 years ago, and is still as strong-growing as ever. The crested fronds are long, tapering and very narrow, only about 2 inches wide, with an arching tendency. The short pinnae consist almost entirely of large crispy rounded crests. A well-grown specimen is a joy in the fern garden.

D. dilatata 'Lepidota cristata'. This very beautiful variety is about 18 inches high, with finely cut tripinnate fronds and reflexed final segments. The fronds are triangular in shape, fully crested, and rigidly upright in habit. They are densely covered with small red-brown scales which give the plant a very distinctive colourful appearance. This variety breeds true from spores. There is also a non-crested form.

D. aemula. I finish Dryopteris with a species which needs no varieties to qualify it for a place among the elite — no variation could add to its present beauty. There was a crested form once — when I saw it the plant was on its way out and has not been recovered. This fern is about 18 inches high (often more). The fronds are triangular with very crisped and bristly pinnules. They feel very hard when slipped through the hand. The colour is bright-green and the stipes are a dark red-brown. Given a good humus soil and light shade this fern can be one of the high spots in the fern garden.

Gymnocarpium

Gymnocarpium dryopteris 'Plumosum'. This is the only variety of this species which is, in itself, a very beautiful dwarf fern for the garden. The fronds, 6 to 10 inches high, rise singly from the thin black spreading (but not excessively so) rootstock, and form beautiful patches of delicate greenery, soft bright green in colour — Druery describes it as "moonlight green", a very sensitive description! They are three-branched, broadly triangular in shape, with very wide overlapping pinnules. This little gem is one of the greatest treasures in the fern garden and it breeds true from spores.

Polypodium

Polypodium australe 'Cambricum'. Our oldest known fern variety, this fern was first found in 1690 in Wales (hence *Cambricum*) by the well-known early botanist — John Ray — the colony still flourishes in its original habitat which is fortunately not very accessible. The variety is a true plumosum, completely sterile — in spite of some claims to the contrary when it has been confused with fertile Cambricum-like finds. The fronds are short, 6 to 15 inches, and very wide, with very broad overlapping pinnae, contracted at the base and deeply divided into long narrow segments at the middle; the texture is thin. This is a creeping fern with fleshy rhizomes, growing on or just below the surface of the ground. It forms spreading clumps and is propagated easily from sections of the rhizome. It is easy to obtain since there is plenty of it around. There are several allied, more divided, sterile varieties which are included in the Cambricum section.

P. vulgare 'Cornubiense trichomanoides'. This very superior fern, said to be a sport from 'Cornubiense' (see my list of varieties in last year's Bulletin) was raised by Backhouse in his York nursery around the turn of the century. It is smaller and more fully divided with narrow tripinnate or quadripinnate divisions, but with the same parental fault of throwing at times fronds partially or wholly reverting to the normal species form. A crested form also exists, 'Cornubiense trichomanoides Jean Taylor', bred and named after his wife by Jack Healey of the now defunct Taylors' Nursery of Bracknell in Berkshire.

CHOICE FERNS: CONIOGRAMME

RICHARD RUSH

Coniogramme species have an exotic appearance which I find appealing. There are circa 20 species, mainly found from the Himalayas to Japan to Malaysia, with Mexico, Africa and Madagascar having one each. Rhizome creeping; frond medium to fairly large; rachis and pinna midrib grooved. Species are similar in general form, but apart from such subtleties as pinna shape, key distinguishing features are entire or serrate margins, venation and sori. Sori lack indusia and follow veins; in some species extending almost to margins, in others leaving a border. Most species have free veins (differing in numbers of forkings), but a few e.g. *C. japonica*, have netted (anastomosing) veins (see illustration a.) This might not seem greatly interesting to every fern grower, I admit, but from these key features it can be established that insofar as species are cultivated and shown in cultivation books — which is not often — they're sometimes muddled up.

I have, at present, four species (I would like to try more, especially Chinese ones .....). Cultivation seems easy enough, with preferably a moist woodland type soil and lavish shelter, for one drawback is that what should he highly ornamental fronds in the winter garden are easily broken by autumn winds, while the chief enemies are slugs and snails: the illustrated frond of *C. omeiense* is, in fact, a reconstruction from what was left of their Christmas dinner! I have young plants of *C. fraxinea* (spores from the Philippines): despite suggestions to the contrary in cultivation books I don't expect that this widely distributed species is hardy. The name was once applied sweepingly; my guess is that what is meant by 'hardy *C. fraxinea*' is, in fact, *C. intermedia*, of which I also have a young plant, currently in a pot in my lath-house. What is shown as *C. japonica* in B.J. Hoshizaki's *Fern Growers Manual* is probably *C. intermedia*: it's certainly not *C. japonica*. I also grow *C. japonica*, the best known species, it is very slow to establish, which seems characteristic of the genus. The subspecies *gracilis*, of which a spore sowing went awry, may be more tender. The illustrated plant is *C. omeiense* var *lancipinna*, which is variegated and came from Szechuan: a treasured donation to the Rush collection, it grows on a timescale similar to *Polypodium australe*. Also illustrated is the underside of a *C. japonica* pinna, collected in January and mellowed by frosts, so the interstices between veins have darkened. In a ripe fertile pinna the tones would be reversed.

a) *Coniogramme japonica,* pinna. underside

b) *C. omeiense var lancipinna,* frond

VARIATION IN BLECHNUM SPICANT

RICHARD RUSH

In January 1977 I sowed spores of *Blechnum spicant* 'Serratum', a wild find I subsequently learned of Martin Rickard. The spores were part of my first batch of BPS spores. I kept more detailed records of the progress of my early sowings than I do now, so I know that the one *Blechnum* I had raised by 1978 seemed to perish in the following winter but revived after close treatment and was planted out in August 1979. It was a good plant until it was dug up by a cat (for customary feline excavatory purposes). One prothallus remained in the original spore culture, and, after transferring it to new quarters, it showed a first frond in 1980. Thereafter it made more normal progress and by 1982 was clearly a consistently and thoroughly dissect form which — after consultation — has been named 'Bipinnatifidum Rush'. 'Serratum' is a fine variety in its own right: my plant is a clear step on, and is consistent in all fronds. This, like *Athyrium filix-femina* 'Kalothrix Coughlin' (see *Bulletin* 1983), demonstrates that the promises with which cultivation books entice us into trying fern raising are not false.

> *Blechnum spicant* 'Bipinnatifidum Rush'. Fronds elliptic-lanceolate, bipinnatifid; pinnae c.5mm wide, deeply lobed or cut almost to the midrib. A characteristic of the plant is the wide spacing of the pinnae.
>
> *Blechnum spicant* 'Serratum Rickard'. Fronds elliptic-lanceolate, bipinnatifid; pinnae sub-falcate, c.10mm wide, lobed or cut half way to midrib. A characteristic of the plant is the lack of a wide space between the pinnae.

For interest I also illustrate a frond from a young plant of *B. spicant* 'Cristatum', ex Cor van de Moesdyk; 'Crispo-minutissimum', a remarkable dwarf form found by Nigel Hall in N.Wales; and an inconstant form of 'Lineare' found in Herefordshire.

Silhouettes of both 'Bipinnatifidum Rush' and 'Serratum Rickard' are illustrated.

SHORTER NOTE

On Finding the Maidenhair Fern in Northants!

Imagine my consummate surprise and amazement when during an otherwise uneventful walk with our dog in December, the plants growing in the mortar of a long-disused railway bridge proved to be not the ubiquitous *Asplenium ruta-muraria,* but of all ferns, *Adiantum capillus-veneris*! And I didn't even know if grew so far from the sea, here in Daventry just about as far from the coast as it's possible to get. Communication at length with Matt Busby suggested its origin as a "garden escape" and revealed the fact that this plant is known from other inland sites. The precise mechanism for the spread inland is apparently unknown, but one could postulate all sorts of hypotheses.

The ferns grow on just one bridge abutment — not the one on the other side of the road — and are fairly numerous. Some tufts appear dead, possibly after the very hard winter two years ago. The living plants are of generally diminutive stature, with fronds at most 25-50mm (1-2") long, hardly luxuriant in habit as the environment would suggest. The abutment faces approximately N.E., height being just under 450ft. O.D., grid reference SP 574 637. In the spring I shall examine the site in greater detail, also paying attention to other railway bridges in the vicinity, and take representative photographs. Obviously, spores will be collected since the offspring may well prove hardy enough to grow in a suitable spot in my garden, admittedly higher than the bridge above mean sea level.

R. P. H. LAMB

Blechnum spicant varieties.
a. 'Bipinnatifidum Rush', b. 'Serratum Rickard', c. 'Crispo-minutissimum Hall', tip missing,
d. 'Cristatum', e. 'Lineare' inconstant form.
All sterile fronds.

FERN VARIETY HUNTING

MARTIN RICKARD

Earlier this century C.T. Druery published several fascinating accounts of fern variety hunting. These appeared in the *British Fern Gazette* Vol.1, p.11 (1909) and Vol.3, pp.93 & 116 (1916) and in *British Ferns and their Varieties* (1910) p.49, and no doubt elsewhere.

Between the Druery era and the present time our journals have frequently referred to wild variety finds, but accounts of fern hunting, as such, have been absent — unless they have escaped my notice.

Encouraged by Jimmy Dyce, I have found the search for fern varieties a very pleasant pastime and I hope, with the aid of this article, to encourage more BPS members to take up this satisfying side of our hobby. Of course, any stroll in a ferny area can uncover a variety; however experience shows that the chances of success can be improved by considering certain factors.

Examination of records for old variety finds will give an indication of the most profitable areas, e.g. The Lake District or the Deven/Dorset borders. Cynics may argue that these are the best areas because the fern men of the past lived in them, but I think there is more to it than that. Certainly I have found plenty of evidence of variation in these two regions.

Another useful clue is to hunt lanes and hedgebanks near past and present fern nurseries or fern gardens. I have found a fine *Polystichum setiferum* 'Divisilobum' near Moly's old house in West Dorset, *Dryopteris filix-mas* 'Grandiceps', *Polystichum setiferum* 'Cristatum' and 'Multilobum' near the site of Dadd's nursery at Ilfracombe, while *Polystichum setiferum* 'Divisilobum' was found near Reg Kaye's nursery in Silverdale by his son Jeremy.

Most of the apparently variety-rich areas are either on limestone or in areas with a calcareous soil. It is in these regions that *Polystichum setiferum, Asplenium scolopendrium* and *Polypodium australe* thrive and it is these three species which I have found most likely to give sports. My experience has been largely concentrated on the area of East Devon, South Somerset and West Dorset in the Axe Valley — the happy hunting ground of great names of the past like Moly, Wills, Jones and Wollaston. Even now useful variation can be found there — but not easily. I consider that to be successful there is a need to show some dedication to the hobby. Moly may have found *Polystichum setiferum* 'Pulcherrimum' several times in one day, but I would estimate that on average I am lucky if I find one moderate variety every 10 hours, and a good variety every 25 hours, but I've never found a 'Pulcherrimum'!! Fortunately plentiful ferns and the surrounding countryside are almost always adequate compensation for failure! Minor varieties, e.g. *Polypodium vulgare* 'Acutum' or 'Bifidum', *Polystichum setiferum* 'Tripinnatum' or *Asplenium scolopendrium* 'Sub-cristatum' are common and can often be found at the rate of several an hour. While of no real merit in themselves, such minor variants are useful in that they indicate a basic tendency to variation within a population. Certainly, I have found *P. setiferum* 'Divisilobum' growing among *P.s.* 'Tripinnatum' and I suspect that 'Divisilobum' is probably an improved selection of 'Tripinnatum' (known affectionalely as 'Tripe' on field meetings!). Whenever I find 'Tripe' now my heart beats a little faster.

In some areas good varieties seem non-existant, despite abundant ferns — for example this is true of the Ludlow area where I live. In nearly three years I have not found a single worthwhile variety!

Not all fern stands seem to have an equal tendancy towards variation. I have found that colonies in shady spots are best — preferably where they are kept damper than average.

Combining these two factors the best locality seems to be at the damp base of north facing lane banks. Of all my wild variety finds about 80% have come from this type of habitat. Jimmy Dyce, conversely has found relatively dry roadside banks also productive. In the past it has been said that varieties are more likely where the species is not particularly common. I remain unconvinced of this; certainly I did find *Oreopteris limbosperma* 'Cristulata' as an isolated plant on Dartmoor, but in the vast majority of cases varieties seem to be among numerous normals, or minor variants, of the species.

Druery also wrote an article on fern hunting in winter *(British Fern Gazette* Vol.1, p.40 (1909)) where he made several very valid observations. He points out that many fern species prone to variation are evergreen, e.g. *Polystichums, Aspleniums, Polypodiums* and *Blechnum,* and because much of the associated vegetation is deciduous it is easier to see the ferns clearly. He also refers to the problem of hedge trimming even in 1909; of course, now this problem is much more widespread and as a consequence summer hunting along many lanes can be frustrating. Hedge cutters remove frond tips thus making the detection of crested varieties very difficult, but other forms of variation, while disfigured, are often still detectable.

Seven species or species groups have given most of our garden varieties, the chance of successful hunting for each varies from region to region. Based on triumphs in the past, and sometimes my own experience, I would recommend exploring the following areas for varieties of each species:

Polystichum setiferum: Usually lime-rich regions. Axe Valley, Devon; Lower Wye Valley, Gwent/Glos. borders; Cotswolds; Brendon Hills, east of Exmoor.

Asplenium scolopendrium: Usually lime-rich regions. Axe Valley, Devon; Lower Wye Valley, Gwent/Glos. borders (in one lane in Gwent, Col. Jones is reputed to have found 29 plants of *A.s.* 'Crispum', the gem of the Hart's Tongues!); southern Lake District; Pennines, particularly in limestone pavements.

Dryopteris filix-mas and *D. affinis:* Lake District; North Devon.

Oreopteris limbosperma: Acid soils. Lake District, particularly southern falls near Kendal; Dartmoor.

Polypodium vulgare agg: Most varieties are *P. australe* which usually grows on limestone rocks and walls in the warmer counties. Southern Lake District; south Devon; lower Wye Valley; Mendip Hills; south-west Ireland.

Athyrium filix-femina: Usually on acidic soils. Lake District; Pennines; Scotland.

Blechnum spicant: Acid soils. Lake District; Mountains of Mourne, Northern Ireland; Scotland; Wales.

Dryopteris dilatata, Pteridium aquilinum, Aspleniums (other than *A. scolopendrium)* and *Polystichum aculeatum.* Varieties could occur anywhere in the range of the normal form of the species, but any variation is uncommon.

This is the situation in the U.K. but what of overseas? Certainly in four seasons hunting in the French Alps the only variety I found was *Asplenium scolopendrium* 'Marginatum' — hardly a treasure! It seems reasonable to assume therefore that in France varieties are rare; however the fern species most prone to variation in Britain are rare in that part of France, so this is perhaps not a fair comparison.

In North America several excellent varieties have been found despite less interest in variation, e.g. *Polypodium glycyrrhiza* 'Malahatense', 'Plumosum' and 'Longicaudatum', *P. virginianum* 'Plumosum' (rediscovered recently), *Thelypteris palustris* 'Pufferae', *Polystichum acrostichoides* 'Bipinnatum' and 'Crispum' (a plumose form). Elsewhere in the world documentation of variety finds is scarce but the existance of such gems as *Woodwardia radicans* 'Plumosum', *Polypodium subauriculatum*

'Knightiae', *P. aureum* 'Mandianum' and 'Mexican Tasseled' and varieties of relatively common houseplants like species of *Pteris,* is ample evidence for the potential of ferns to vary throughout the ferny regions of the Earth, although curiously, as pointed out by Richard Rush (*Bulletin* Vol.2, No.5), a disproportionately high number of first class varieties has been found in the U.K.

While I cannot suggest variety-rich regions or habitats outside the U.K., I hope the above very incomplete list of successes may encourage more overseas members to step up the quest for varieties in their respective regions.

One of the problems of the variety hunter is the thorny dilemma of whether or not a plant should be collected. I believe the responsible attitude to this must be, yes, within certain guidelines. I would suggest that varieties should not be collected in a region where the normal form of the species is rare, nor, obviously, should varieties of national rarities ever be collected. If a variety deemed worthy of collection is found, it is advisable to consult the landowner and/or local naturalists before taking any action. If justification for collection from the wild is needed one only has to remember unique finds of about 100 years ago which are still with us in cultivation, e.g. *Polystichum setiferum* 'Plumosum Bevis' and 'Plumosum Moly' and *Asplenium scolopendrium* 'Crispum Nobile' etc. etc. which would no doubt have died out long ago in the wild. A modern example of this is a colony of ramose Hart's Tongue in a quarry at Brigham in Cumbria which has recently been buried by rubble — there are many other examples of similar losses.

Finally it is sometimes argued that wild variety hunting is a waste of time, it being easier to raise new varieties from spores. Certainly new plants to a collection will be more rapidly accumulated by means of propagation, but it is sometimes overlooked that ferns from the wild are more likely to provide a *new source* of variation, with the possibility of an entirely new break. I personally pursue both activities with equal pleasure and often combine them by sowing spores from my own wild finds. Richard Rush's success in raising *Blechnum spicant* 'Bipinnatum' (see separate article in this issue) would not have been possible without the parent, *B.s.* 'Serratum' which I found wild in Wales on a Society excursion. It was sheer luck that I was the first one to see it!

From time to time Jimmy Dyce has compiled surveys of new variety finds for publication in past *Bulletins*. These form a valuable record of varieties being brought into cultivation and we would welcome news of new finds — whether from the wild or 'breaks' in cultivation — with, if possible, specimen fronds or parts of fronds.

DID YOU KNOW?

The most prolific producer of varieties is the Lady Fern.

DID YOU KNOW?

One single spore has been known to produce *SEVEN* plants, all of a most interesting new fern variety.

DID YOU KNOW?

There are 50 fern species in Britain (excluding hybrids and allies).

DID YOU KNOW?

E.J. Lowe recorded and described 1861 fern varieties in Britain. (A very large number of them were not worth recording and today would be thrown on the compost heap!)

J. W. DYCE

GROWING FERNS IN BOTTLE GARDENS

NIGEL HALL

Why grow ferns in bottles?

There are a number of ferns which would not normally thrive in the dry and draughty rooms of modern centrally-heated houses. By growing these ferns in a closed, or partially closed, container they are able to enjoy a humid, still environment and yet be grown indoors. There are some ferns that need almost one hundred per cent humidity, a condition that is almost impossible to achieve without some form of closed container. Ferns in bottles are also kept free of dust and may be left for long periods without watering.

What kind of container is needed?

Almost any glass or transparent plastic container that is large enough to hold one or more ferns is quite satisfactory. It may be a glass sweet jar, an old acid carboy or an aquarium tank with a top. You may find some quite different types of container that are suitable. It is possible to buy glazed cases, rather like miniature greenhouses. The container may be completely sealed by some kind of top or lid, or it may have a small opening. If the opening is too large then high humidity cannot be maintained.

How should the container be set up?

It is important to remember that few ferns like stagnant conditions. The secret of successful bottle-gardening is to set up the container so that it has ample soil and moisture but not so much that the contents become stagnant. As there is no drainage in a bottle garden the bottom layer must always be grit, gravel or perlag. It is useful to add some crushed charcoal to the grit. Charcoal carries out the useful function of removing the impurities that occur. It thus helps keep the inside of the container fresh.

On top of the grit must be placed some sterilised compost. It is best if it is loose and well drained. It would be fatal for most ferns if it became soggy. A peat-based compost with some loam and grit added will supply adequate nutrient for a considerable length of time. If the compost is just damp to the touch it is wet enough.

Personal taste will dictate the layout of your container. You can build slopes or mounds and add small rocks to create a natural looking environment.

Where should the container be placed?

Most ferns need a reasonable amount of light but definitely not direct sunlight. Either place the bottle by a north-facing window or a little way back from a south-facing window, just out of reach of the sun's rays. It is possible to light the bottle using fluourescent tubes, just as some aquariasts use them above fish tanks.

What maintenance is required?

Once the container is planted very little maintenance is needed. If the bottle is completely closed it may never require any watering. If it is partially closed, watering will be necessary as the compost dries out. It is better to mist thoroughly than tip water in. Once in it is almost impossible to get it out. Any weeds or unwanted plants should be removed as should any fronds which begin to die. If any plants begin to grow too large, or start to smother other ferns, then they should be removed. If everything has been done properly then you should have created a virtually self-contained environment requiring only minimal attention on rare occasions.

What are the most suitable ferns?

The simple answer is — small ones. Too often commercial bottle gardens are planted with ferns which will, in a couple of months, outgrow the container. The other type of fern to avoid is the one that spreads quickly and smothers more delicate ferns.

There are many small or slow growing ferns, as well as dwarf varieties of some of the larger species. The notes below concentrate on hardy ferns as these make no special temperature demands.

An ideal fern for the bottle garden is *Asplenium marinum* (Sea Spleenwort). This normally is very difficult to grow indoors as, in its natural habitat, it is used to high humidity. In a bottle garden its glossy fronds grow luxuriantly. The smaller aspleniums, the Maidenhair Spleenwort (*Asplenium trichomanes*), the Black Spleenwort (*Asplenium adiantum-nigrum*) and the Lanceolate Spleenwort (*Asplenium billotii*) will all make exceptional growth in a bottle garden. One fern that will tolerate some stagnation is the Hard Fern (*Blechnum spicant*). This has spreading, dark green glossy fronds with upright, narrow fertile fronds. A number of dwarf forms exists (see page 42), which are perfect for the smaller bottle garden. A dwarf American maidenhair fern (*Adiantum pedatum* 'Sub-pumilum) has bright green imbricate fronds while the small New Zealand fern *Blechnum penna-marina* shows its bronze-red fronds to perfection in the increased humidity of a closed container. There are many dwarf varieties of the Hart's Tongue Fern (*Asplenium scolopendrium*). The shiny strap-like fronds can be crisped, curled or tasselled; a whole range of variations for added interest in the bottle garden.

There are, of course, many more suitable ferns to be found. Part of the fun lies in discovery and experimentation.

FOR FURTHER INFORMATION

ASHBERRY, A, *Bottle gardens and fern cases,* Hodder, 1964.
HOKE, J, *Terrariums,* Franklin Watts, 1974.

SHORTER NOTE

On Light Gardening .....

When we lived in Stockport, a visit to Nigel Hall's house revealed not only fine collections of both ferns and cacti, but something of a revellation, a light garden (*Bulletins* 1981 and '82).

During the Christmas period, I thought I'd build one myself to improve spore raising capacity, and at time of writing it is still undergoing tests. Basically a frame structure with a solid base (actually an old wardrobe door made of chipboard), and having a 1200mm (4ft) double fluorescent tube unit (warm white and daylight), controlled by an old central heating timer modified to give one on/one off per 24 hours, and providing 14 hours of "daylight". Two tungsten bulbs are linked to a thermostat to maintain 16°C., the whole thing being housed in the loft, hence the need for heat. I can't yet comment on its effectiveness, but do plants need a "rest" in terms of warmth as they do with light, or should a constant temperature be the aim? More results next year perhaps, and if any help is required to modify timers or with wiring, I shall be pleased to advise.

R. P. H. LAMB

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The British Pteridological Society

PTERIDOLOGIST

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Edited by M.H. Rickard

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Material for publication should be sent to Dr M. Gibby, British Museum (Natural History), Cromwell Road, London, SW7 5BD

Editor of the Pteridologist M. H. Rickard, The Old Rectory, Leinthall Starkes, Ludlow, Shropshire, SY8 2HP

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The BRITISH PTERIDOLOGICAL SOCIETY was founded in 1891 and today continues as a focus for fern enthusiasts. It provides a wide range of information about ferns through the medium of its publications and available literature. It also organises formal talks, informal discussions, field meetings, garden visits, plant exchanges and a spore exchange scheme. The Society has a wide membership which includes gardeners, nurserymen and botanists, both amateur and professional. The Society's journals the *Fern Gazette, Pteridologist* and *Bulletin* are published annually. The *Fern Gazette* publishes matter chiefly of specialist interest on international pteridology, the *Pteridologist* topics of more general appeal, and the *Bulletin* Society business and meetings reports.

Membership is open to all interested in fern and fern-allies. Subscription rates (due on 1st January each year) are Full Personal Members £7; Personal Members not receiving the *Fern Gazette* £5; Student Members £5; Subscribing Institutions £8. Applications for membership should be sent to the Membership Secretary (address above) from whom further details can be obtained. (Remittances made in currencies other than Sterling are £0.50 extra to cover bank conversion charges).

Back numbers of the *Gazette* and *Bulletin* are available for purchase from the Treasurer (address above), from whom further details can be obtained.

Front Cover: *Athyrium filix-femina* 'Deficiens percristatum',
raised by Jimmy Dyce from *A.f.* 'Deficiens'

This issue is dedicated

to

JAMES WOOD DYCE, FLS

on the occasion of his Eightieth Birthday
27th May 1985

James W Dyce in his natural environment Chard BPS Meeting, Somerset, August 1981 *(Photo C N Page)*

Ordinary Member of the British Pteridological Society	1935-1975
Honorary Member	1975 ⟶
Auditor	1939
Treasurer	1947-1975
Membership Secretary	1947-1977
Secretary	1959-1979
Editor of the Newsletter	1963-1972
Editor of the Bulletin	1973-1979
Booksales Organiser	1969 ⟶
President	1979-1982
Vice-President	1982-1985
President Emeritus	1985 ⟶

James W Dyce, as many will know him in the field,
with a plant specimen (here a suspected *Dryopteris x tavelii* hybrid) in one hand
and his field notebook in the other.
Chard BPS Meeting, Somerset, August 1981.
(Photo C N Page)

EDITORIAL

This issue of the *Pteridologist* is dedicated to Jimmy Dyce on the occasion of his eightieth birthday and the fiftieth anniversary of his joining the British Pteridological Society.

Jimmy gave details of his involvement within the Society in the *Bulletin* in 1982 (Vol. 2, No. 5, p.185). It is an incredible record — 115 man years given to the Society in various posts. He has held virtually every office and has already been honoured by the Society — he is one of the few recipients of the Stansfield Medal, and at this year's AGM he was created the first President Emeritus in the Society's history.

Clearly we have much to thank Jimmy for, as shown by tributes from several members in this issue. For many his main contribution to the well-being of the Society has been his ability to share his enthusiasm for ferns with others. This has been well shown by the lasting friendships built up across the world with other fern enthusiasts — often solely by means of letters. But, more important, to those of us in the UK, has been his ability to share his knowledge of British ferns and their varieties on Society field meetings.

I first met Jimmy (shorts and all!) on the Isle of Arran in 1969. The ferning and the company was good — I was hooked. Since then I have been on dozens of excursions, back in the seventies you always knew Jimmy would be there — the meeting would be a success. He still comes on meetings of course, only last August in his eightieth year he tramped over the Lakeland fells and the nearby limestone pavements more nimbly than some of the rest of us. However, he did not partake of the official lunchtime swim, unlike when we were not far away in 1974. Then Jimmy was climbing on the cliffs by the Black Force waterfall, north of Sedbergh, something gave and Jimmy was gone. I did not actually see it happen but I did hear the splash and see him come up "like a cork"! Fortunately he was not injured but it took about an hour to cover the two miles of rough country back to the cars. On arrival there Jimmy protested that he was all right and had dried out anyway, and was raring to get on to the next site. I am glad to say we had a doctor in the party who disagreed and took Jimmy straight back to the hotel for a hot bath! That was when he was a youngster at sixty-nine!!

He has never been shy of cliffs or rocks. On one occasion in the Wye Valley he climbed up some cliffs, without ropes etc., to get a closer look at a promising Asplenium. As he carefully made his way back down some climbers equipped with all the gear laboriously climbed up past him! Memories of Jimmy from excursions are legion and, as above, often amusing. There was the time when he and I were leading a convoy of cars at Bovey Tracey. We were so engrossed in conversation while I drove that I did not notice the others had been left behind — we did not meet up again until the evening! That day Jimmy found *Polypodium australe* 'Semilacerum' and other rather interesting polypodies at Buckfast. Not far away at the Chard meeting in 1972 one lunch stop was taken in a very secluded lane on Bewley Down when everything stopped abruptly and the odd sandwich went flying when it was realised that just over a low hedge behind us a male nudist was trimming the edges of his lawn ... or was he pruning the roses! Earlier that morning I had found a crested Lady-fern, I was not very impressed. Jimmy was only a few yards away in a swamp of tussock grass. He *was* impressed and I felt honoured that he even wanted a crown! Subsequently my crown died but Jimmy's grew well and he named it *Athyrium filix-femina* 'Longipinnulum Rickard' (although I think 'Dyce' would have been more appropriate in the circumstances). Until this last summer Jimmy had the only plant, but now even I have taken notice of it and I have successfully widged off a side crown (to 'widge' is a verb I recently learnt from Fred Jackson, I think it is beautifully descriptive and I would like to know if it is a modern word or one that has been handed down).

Mainly on Society excursions, but occasionally privately, I know Jimmy has seen just about all our native ferns and fern allies in the wild. Top of his list must be *Trichomanes speciosum*. He has seen this in at least three wild localities but I think he is disappointed

that he has never seen it in his native Scotland — despite many hours spent looking for it on the Isle of Arran and elsewhere. Hopefully one day he will get the chance to visit the recently rediscovered colony on Arran. All the time while botanising Jimmy also kept records of fern distribution. These records played a very important part in adding interest to Society meetings and helped to make the *Atlas of Ferns* (published by the BPS and BSBI in 1978) more complete than would otherwise have been possible.

One of Jimmy's non-fern highlights must be his find of a double form of *Calluna vulgaris.* He found this on the area behind the dunes at Winterton in Norfolk. I was very scathing about it at the time — being obsessed with the hunt for *Dryopteris cristata* (unsuccessful that day) or *Osmunda regalis,* which we had found. However, Jimmy once again had the last laugh as the find turned out to be one of the best wild finds in *Calluna* this century. I believe it is now called 'Jimmy Dyce'.

Many of Jimmy's wild fern finds of course spread back to well before my time. I know one of his favourites is his *Athyrium filix-femina* 'Deficiens'. This is a curious incised form of Lady-fern with the basal pinnule segment missing on every pinnule. Jimmy has raised two more distinct forms from this parent — *A.f.* 'Deficiens cristatum' and *A.f.* 'Deficiens percristatum' (illustrated on the front cover of this journal). Back in the 1950's while ferning with Percy Greenfield in East Devon near Colyton he found *Polystichum setiferum* 'Acutilobum Colyton' — a fine form although not a bulbiferous one (see Fig. 1). Of Jimmy's

Fig. 2

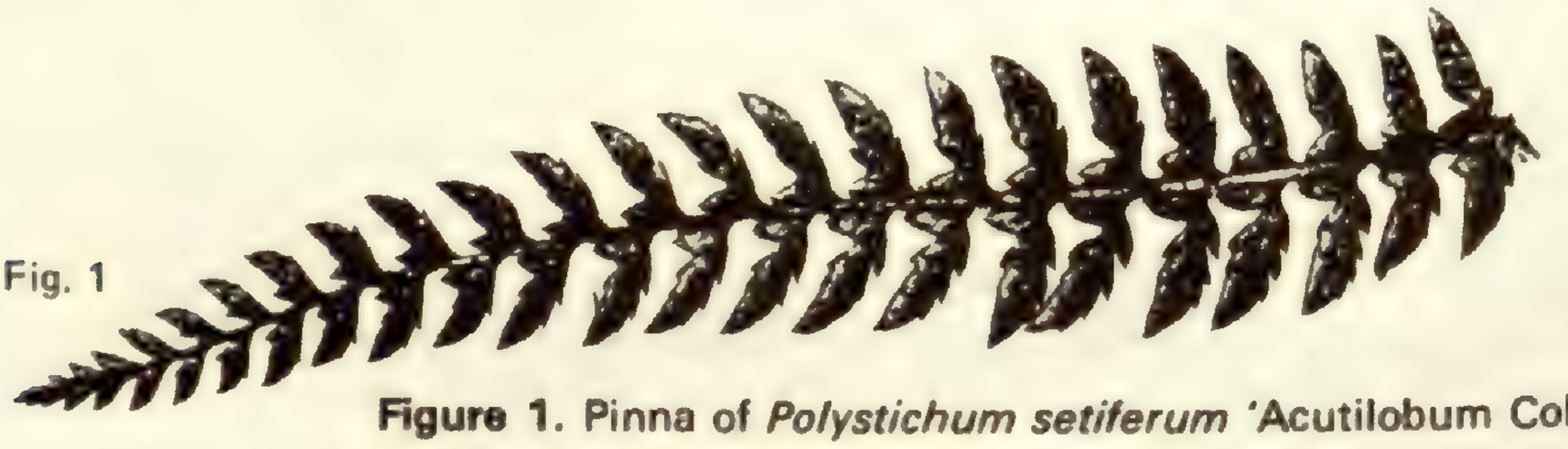

Fig. 1

Figure 1. Pinna of *Polystichum setiferum* 'Acutilobum Colyton'
Figure 2. Pinna of *P. setiferum* 'Falcatum Dyce'.

wild finds that I have seen my favourite is *Polystichum setiferum* 'Falcatum Dyce' (a pinna of this is shown in Fig. 2). As a detached pinna it does not look all that exceptional, but when seen as a mature plant with deeply incised falcate pinnules it is very handsome. As a bonus, through spring and early summer, while the fronds are relatively young, they are a rich golden colour. By autumn however the normal green of *P. setiferum* is restored. The name *P.s.* 'Falcatum aureum Dyce' has therefore been suggested. In 1976 during the Ilfracombe meeting I was present when Jimmy made one of his more recent finds. This was a *P. setiferum* 'Acutilobum' on a roadside bank at Martinhoe. It was growing right by where we parked the cars, but it took Jimmy's trained eye to spot it!

From the foregoing it is obvious that without Jimmy I would not have been bitten by the fern bug quite so deeply, nor I suspect, would many other members. The whole Society owes him a great deal, not only for its strength now, but also for its actual existence after the trauma of the 1940s when at one time Jimmy alone worked for its survival.

Finally, to more mundane matters — please continue to send in contributions for future issues of the *Pteridologist* — it is *your* journal. The range of acceptable subject matter is very wide as evidenced by *Pteridologist* 1 and 2 and earlier *Bulletins*. (Of course technical material should continue to be submitted for publication in the *Gazette).* Ideally copy should be:

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Martin Rickard

TRIBUTES TO JIMMY DYCE

A TRIBUTE FROM DOWN UNDER

As a young man I had a keen interest in ferns, caring for a small lath-house on my parents property in Burwood, New South Wales, Australia. Most were acquired on excursions from our holiday home at Lawson in the Blue Mountains. However involvement with work and several organisations limited any serious study. Many years later, following the loss of my parents, I found what remained of this collection; some of the plants are still alive to this day. These include the *Platyceriums,* slow to grow from spores but practically everlasting once established. As my interest developed and the collection of species grew; I obtained the few books that were available locally on fern types. At the time four works could be obtained that only covered a few well established local plants. I, therefore, decided to contact our botanical authorities by writing for any additional material that was available; this exercise proved very futile; in one instance I waited two years for a reply, after a number of letters had been posted. So I decided to write to Kew Gardens in England explaining my difficulties. Imagine my surprise when an air mail letter came to hand promptly, promising both information and fern material if required, with the suggestion that, as they had a large programme to cope with, I should approach Mr James W Dyce of "The British Pteridological Society" with a view to becoming a member. Another letter of explanation to Jimmy Dyce received an immediate reply and I became a member of the BPS. Thus a firm friendship began with Jim; who over the years through his book sales and many letters enabled me to more than satisfy my desire for information. Obviously Jimmy has accepted the role of looking after the remote members of the Society. No mean task when I consider some of the requests that myself and other members throughout the world have made of him. He often refers to his many "Good Friends"; may I add that I am glad to be incuded in this list. Many of the early English botanical works he obtained for me cover a world wide range of ferns including most if not all of our Australian species. Even where nomenclature is out of date revision becomes simple with the use of "The New Generic Sequence" by J A Crabbe, A C Jermy & J T Mickel, published by the Society some years ago. BPS "Bulletins" and "Gazettes" enable one to update most material, providing access to modern techniques. Here also I should like to include two other members who over the years have also become valued friends through continued correspondence — Phillip Coke and Richard Cartwright. Perhaps it is time to say thanks to all the key members who do so much to make BPS such a fine organisation and especially to Jimmy Dyce.

Ray Best

that he has never seen it in his native Scotland — despite many hours spent looking for it on the Isle of Arran and elsewhere. Hopefully one day he will get the chance to visit the recently rediscovered colony on Arran. All the time while botanising Jimmy also kept records of fern distribution. These records played a very important part in adding interest to Society meetings and helped to make the *Atlas of Ferns* (published by the BPS and BSBI in 1978) more complete than would otherwise have been possible.

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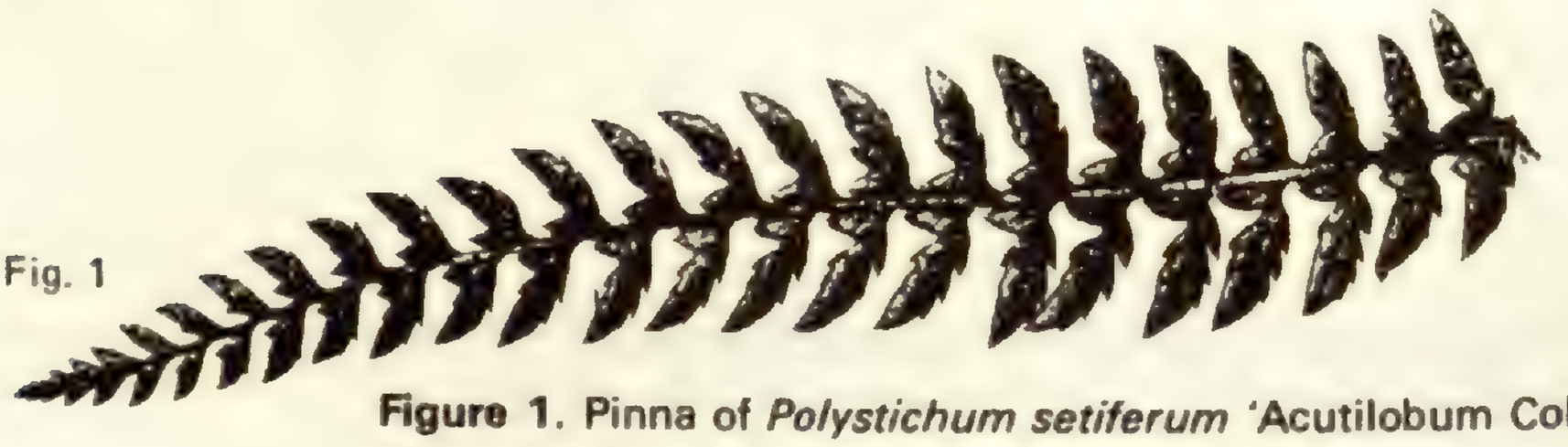

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TRIBUTES TO JIMMY DYCE

A TRIBUTE FROM DOWN UNDER

As a young man I had a keen interest in ferns, caring for a small lath-house on my parents property in Burwood, New South Wales, Australia. Most were acquired on excursions from our holiday home at Lawson in the Blue Mountains. However involvement with work and several organisations limited any serious study. Many years later, following the loss of my parents, I found what remained of this collection; some of the plants are still alive to this day. These include the *Platyceriums,* slow to grow from spores but practically everlasting once established. As my interest developed and the collection of species grew; I obtained the few books that were available locally on fern types. At the time four works could be obtained that only covered a few well established local plants. I, therefore, decided to contact our botanical authorities by writing for any additional material that was available; this exercise proved very futile; in one instance I waited two years for a reply, after a number of letters had been posted. So I decided to write to Kew Gardens in England explaining my difficulties. Imagine my surprise when an air mail letter came to hand promptly, promising both information and fern material if required, with the suggestion that, as they had a large programme to cope with, I should approach Mr James W Dyce of "The British Pteridological Society" with a view to becoming a member. Another letter of explanation to Jimmy Dyce received an immediate reply and I became a member of the BPS. Thus a firm friendship began with Jim; who over the years through his book sales and many letters enabled me to more than satisfy my desire for information. Obviously Jimmy has accepted the role of looking after the remote members of the Society. No mean task when I consider some of the requests that myself and other members throughout the world have made of him. He often refers to his many "Good Friends"; may I add that I am glad to be incuded in this list. Many of the early English botanical works he obtained for me cover a world wide range of ferns including most if not all of our Australian species. Even where nomenclature is out of date revision becomes simple with the use of "The New Generic Sequence" by J A Crabbe, A C Jermy & J T Mickel, published by the Society some years ago. BPS "Bulletins" and "Gazettes" enable one to update most material, providing access to modern techniques. Here also I should like to include two other members who over the years have also become valued friends through continued correspondence — Phillip Coke and Richard Cartwright. Perhaps it is time to say thanks to all the key members who do so much to make BPS such a fine organisation and especially to Jimmy Dyce.

Ray Best

A LEGACY OF PTERIDOMANIA

A mere modicum of the happiness
Conferred on me by you
A minutissima of the joyfulness
And friendship warm and true
By this "tribute" is expressed.

Perhaps the most appropriate way to express my thanks for the time and energy Jimmy Dyce has invested in introducing me to the history and identification of British ferns and their many variations is to paraphrase the above poem he composed for me. How could I resist becoming an avowed pteridophile under the tutelage of such enthiastic expertise? It has become inevitable that I shall spend a lifetime immersed in old fern books and sowing and re-sowing millions of spores in that elusive search for the treasures of the past and the wonders of the future. Just writing about it causes the adrenalin to flow, the heart beat to quicken, and the fingers to become anxious to sort through a new crop of sporlings.

Our correspondence began in 1977 with some questions about fern varieties being grown here in the Pacific Northwest. After reading Charles Druery's *British Ferns and Their Varieties* and Reginald Kaye's *Hardy Ferns,* I ventured to question the validity of the archaic and Americanized names used here for ferns with obvious and very well documented English origins. "Mrs Jones" was soon rewarded with a three page letter enumerating the merits and demerits of the fronds sent for inspection. A spark was lit by this detailed epistle that took me beyond the fern "hunting" I had only been able to achieve through books.

By the fall of 1979, after two years of correspondence and many packets of spore, I was eager to meet the ferns I had read about and the man who had brought them to life for me. Then in October of '79 I was ablê to have my first encounter with Jimmy and parts of England on my way to trek in Sikkim. I was totally overwhelmed with a schedule that included meeting many marvellous people, especially such BPS members as Anne Sleep, Martin and Hazel Rickard, Ray and Rita Coughlin, and Phillip and Mary Coke. With only five days in which to zip about meeting people and ferns I still have a rather kaleidoscopic memory of my first trip.

Could it be that the lovely dinner prepared by Jimmy's good friends Betty and Vic, where we had at least four different sorts of alcoholic beverages before, during, and after dinner, may have put me in a haze? Being a relatively "dry" person I found myself trying to finish off all four glasses simultaneously by the meal's end. And, of course, not wanting to be rude I just nodded yes to everything including Jimmy's queries in his unfamiliar Scottish brogue. After two days of noting that I just smiled and nodded affirmatively to everything he said, he put the question to me point blank.

"You don't understand me half the time, do you?" Funny though, I always could make out the information about various ferns.

Well, after my sojourn there, there was nothing for it but that a reciprocal visit was in order. It only took a minor amount of arm twisting to convince Jimmy that he only need wend his way to Seattle and we would put a roof over his head and ferns in his path. Although we may not have packed the same level of intense action into his two month visit as I had on my short week in England, we didn't do too badly. We traversed the North American west coast from the primitive wilds of Lone Butte, British Columbia, Canada, to motorboating on the muddy Colorado River winding through the arid southwestern desert near Yuma, Arizona.

Lone Butte is about one third of the way into the interior of British Columbia on the Alaska-Canadian highway. My husband's father is a retired cattle rancher who now lives in an historic 1927 log hotel in this small lumber community. The denizens of the Butte

still ask after the "Englishman" I brought up to stomp through the surrounding woods. All the locals were quite interested in our forays and questioned us about the plant specimens with which we returned.

Visiting there in early July we were rewarded with the sight of many patches of that minute orchid jewel, *Calypso bulbosa*. Jimmy's eyes are keen and I must admit to feeling like a bumbling fool as I tromped over and past treasures galore which were duly pointed out to me by my gleeful guest. We were most fortunate to also be there when the saprophytic orchids, *Corallorhiza maculata* and *Monotropa uniflora,* were displaying their eerie magic. Fern-wise the area is not rich but it does have some interesting fern allies. The Butte itself, a smallish flat-topped rock outcrop, has colonies of *Cystopteris fragilis* and *Woodsia scopulina* nestled in the lichen encrusted boulders on the northern and eastern sides. A tramp through the Jack Pines uncovers such noteworthy items as *Lycopodium annotinum, L. complanatum, L. selago,* and assorted selaginellas.

For the hardy soul there's the challenge of fighting off armies of giant mosquitoes while crawling about in a sphagnum bog to get eye to eye with *Equisetum scirpoides.* Wet knees are essential to viewing this curious little species since it grows among mosses and is partially buried by the humus from the overhead conifers. It is an odd plant with its thin, flexous zig-zag stems and makes a tidy container subject or ground cover. Keeping it company in the cold bog are lovely mats of glossy leaved Western Tea-Berry *Gaultheria ovatifolia,* the waxy whorled obovate-leaved Pipsissewa, *Chimaphila umbellata* var. *occidentalis,* with loose semi-umbels of odd pinkish flowers, and that common but much beloved northwestern dwarf dogwood, *Cornus canadensis,* with its circle of pointed cream colored bracts poised against the dull green of its ribbed leaves.

Although Western Washington is not rich in its number of different fern species we do have great numbers of some individual ferns such as *Polystichum munitum, Athyrium filix-femina,* and *Pteridium aquilinum.* Less widely spread in geographic terms but still occurring in substantial numbers are *Adiantum pedatum, Blechnum spicant, Dryopteris expansa,* and *Polypodium glycyrrhiza.* A little hiking in the higher elevations will turn up *Asplenium trichomanes, Athyrium distentifolium, Cryptogramma acrostichoides, Cystopteris fragilis, Polypodium hesperium, P. montense, Polystichum andersoni,* and *P. P. lonchitis.* Close scrutiny of specific locales along the coast will bring to light two of my favourites, *Polypodium scouleri* and *Woodwardia fimbriata.* Crossing over the Cascade Mountains into Eastern Washington takes one into a wholly different environment and many different species. But that is a tale for another story that should be told.

The most valuable lesson I learned stemmed from Jimmy's absolute amazement over the incredible number of *Polystichum munitum* that proliferate everywhere here. Familiarity with a fern should not be allowed to deteriorate into complacent acceptance. Those very numbers which relegate *P. munitum* to a contemptuous niche as "just those common old Sword Ferns" are the very key to fine varietal sleuthing. Jimmy and I spent one exhilarating afternoon on a winding hilly boulevard coursing through prime Seattle real estate collecting particularly nice minor variations of *P. munitum.* Of course all the passer-bys thought us indubitably bonkers and no-one questioned our authority to collect such common plants. To many people all ferns look alike and they want to know how to eradicate them from their rockeries and gardens, not collect and nuture them. After that afternoon I have never been able to pass by a single *P. munitum* without at least a cursory scrutiny and oft-times a much closer inspection. I have acquired a reputation as a Sword Fern fondler and am considered quite eccentric by casual acquaintances. Close friends overlook this "kinky" flaw in my character and accept me for what I am, a pteridomaniac. All this just because I asked some innocent fern questions of a man who really knew the answers.

Having two sets of parents who live almost two thousand miles apart makes it possible to see a lot of the Western United States economically. Knowing that my mother and father had first class accommodation for us in Arizona we headed down that way. We took a slight detour through Idaho with a load of antiques bound for my brother's new residence there. Once we were unloaded there was plenty of space for the three of us, Jimmy, 18 month old Daphne, and myself. My darling husband, Clifford, ended up tending to the plants and animals at home and keeping the whole homefront solvent by working. To our return trip would be added the irrepressible energies of our six year old son, Ben. Jimmy not only got to see a great deal of country but he also got to experience family life at its most energetic point.

Ours was undoubtedly one of the speediest western tours on record as we headed almost non-stop except for a night in Las Vegas. What looked so flashy as we drove in after midnight was certainly tawdry by daylight and we lost no time getting back out onto the road among the wonders wrought by nature. We curved past the marvellous engineering done on Boulder (formerly Hoover) Dam and onto the even more incredible engineering done by nature to carve out the Grand Canyon. Unfortunately our progress through these areas was so rapid that we had little time for pteridophyte pilfering. Not that we didn't try or that Jimmy didn't tantalize me by pointing out distant hills that obviously harboured *Cheilanthes* by the score. Someday I'll get back there just to see.

We began nearing our destination to the southwestern corner of Arizona which is nestled next to Mexico's northern boundary and within spitting distance of California's eastern border. Keep in mind that we're tooling along in air-conditioned comfort at mid-day in mid-July in low desert country. As I pointed out different trees and shrubs Jimmy decided on a closer inspection of the desert mistletoe swinging from the green limbed Palo Verde trees. He was astounded that our desert was so filled with plants and not another sandy Sahara. The scorching blast of the mid-day heat almost withered him in his brief jaunt from van to tree and back again. But it takes more than a little Arizona sunshine to sap the strength of a man who professes to have chased butterflies in the fiery noon heat of India!

There aren't too many native ferns to be seen at summer's height but I don't remember any complaints as my folks treated us to lots of boating, swimming, water skiing (I skied and Jimmy watched), and delicious barbequed beef, venison, and wild duck.

Our return north took us through many impressive tropical fern collections and although we were fascinated by such exotic splendour our affection for the wondrous diversity of temperate ferns only increased by comparison. There are so many memories that we share beginning with that first meeting in England. We've traversed the Everglades and braved caterpillars dropping on us like raindrops in the Corkscrew Swamp Sanctuary while viewing the Florida ferns to careering about the English countryside with me at the wheel of Jimmy's trusty Renault for my second encounter with old and new ferns and fern friends. All the memories are not just linked with fern exploits for one of my fondest remembrances is of the many times Jimmy became toddler Daphne's captive in her negotiation of our household stairs on an upright level. She soon determined that he was the one with a spare hand when we were all occupied with other necessary household tasks.

I could go on and on recalling the funny moments, the serious discussions, and the quiet comradeship we've shared because it has been all that and more that has made Jimmy and ferns two of the greatest joys and loves of my life. I am fortunate to have a husband and children who understand this need to develop my occupational passion and a dear friend who brought it all to pulsing vibrant life.

Thank you Jimmy! As I contemplate your 80th birthday I feel a great responsibility to keep on learning as much as possible so that I may pass it on to another kindred spirit as you have done.

Judith Jones

TREASURY OF FERNS

Some 15 years ago, a friend who was a keen — and orderly — gardener, commented while going round my garden, Greencombe, 'You do have a fern problem here, don't you?' He was looking at the dry stone walls supporting the terraces above the lawn, but, of course, both stones and walls were invisible, hidden by an over-bountiful scrum of ferns. They had come uninvited and conditions were to their liking.

'What you need,' my advisor went on, 'is a systemic poison. Just spray it on the fronds and it'll go down into the roots and kill them.'

'I shall be cutting them for compost next week', I said, disliking his idea.

I knew the wall looked much better once the long fronds had been cut, and the Maidenhair Spleenwort growing behind them could be seen against the stone once more. But the act of cutting worried me; it could well be that in my ignorance I was damaging something rare and special, for, although I could recognise *Asplenium trichomanes,* I did not know what any of the other ferns were.

Every evening I took in a few fronds and endeavoured to identify them, but question marks invariably remained. I was uncertain, and Reggie Kaye's book 'Hardy Ferns' did not enable me to distinguish between *Dryopteris dilatata, D. aemula* and *D. carthusiana.*

Frequently I had to refer to the glossary in Appendix II and one night I read Appendix I, a note about the British Pteridological Society giving the name and address of the secretary. The next day, greatly daring, I wrote a request for help and sent it to J W Dyce. Before the week was out his answer came:

'I have every sympathy with your difficulty in naming ferns for it can be a problem if you are trying to work on your own ... the only way is to see the ferns in the company of someone who knows them ... I have one suggestion which, if you can adopt it, will be of great help to you. On the first weekend of October my Society is holding a weekend meeting in the Wye Valley, with our centre at the Royal George Hotel in Monmouth. There will be about 6 — 10 members there, some of them, like you, very much in the beginner stage, and if you can manage to join us, not necessarily as a member, for we welcome visitors at our meetings, we shall be very pleased to give you a good introduction to ferns in the field.'

Only Jimmy Dyce could have sent such a prompt, courteous and irresistable invitation! I set off for Monmouth, eager and ignorant, and came back 48 golden hours later, well and truly pteridologed.

As everyone who has been educated by Jimmy knows, he does not just tell you the name of a fern and assume you will remember; the next time round, you have to identify — and give sound reasons. If you have difficulty, he provides you with a neat and witty guide-line to prevent you from ever again going astray:

'You can't mistake a golden scale male fern; the pinnae have been cut out with scissors, straight across.'

'All polystichums have thumbs. Just look at the first pinnule — move it if necessary — and if there's a thumb sticking out at the bottom side, it's a polystichum.'

He even gave me Dycisms for ferns we did not see that weekend.

'How could I tell a *Dryopteris aemula* if I found one?' I asked him.

'It's crisp; it looks crisp and it feels crisp. Run your hand over the fronds and you'll know by the feel of it,' was his reply.

'And how would I tell a *Dryopteris carthusiana*?' I persisted.

'It doesn't form a shuttlecock.' All Jimmy's guidelines were simple and to the point.

Jimmy taught me how to look and how to see. He educated my eyes and, with him, it was the greatest imaginable fun.

He did more than that. Originally, I had only wanted to learn about native fern species, but his knowledge and enthusiasm, and the books he brought along to meetings, fired me with interest in the varieties. I began to dream of ferns in the garden, not as an indifferent scrum, but forming patterns, adding a further dimension, and providing the most pleasing, natural and exciting ground cover between shrubs and trees.

In this, too, Jimmy helped me, giving me ferns with fantastic generosity. Parcels arrived containing treasured specimens, and my notes became longer and more complicated as I struggled to keep pace. Gradually I learnt two things. First, that while some ferns were in their natural element at Greencombe, others found it a difficult habitat and required great care. This is the lot of every gardener!

I also began to experience the 'jiz' of ferns, a recognition and enjoyment of the pattern through which each species proclaims its identity, not by small signs but in every line and pinnae. This experience comes when the problem of finding the right name has receded into the background; when you are not delving through a mixed selection, seeking some individual variation worthy of note; when, on some field day, Jimmy takes you to a special site and you see one species dominant and thriving, completely at home, revealing itself.

That was how we found *Dryopteris aemula* on the north coast of Arran, when, after trekking along a boulder strewn shore, we saw them, under birch trees, several hundred yards away. Even from a distance their crispness and greenness stood out. Seeing one or two *D. aemula* should enable you to recognise them; with the sight of several acres they impress their personality upon the mind.

So, with Jimmy, I learnt the value and beauty of the repeat pattern in a colony of ferns, and acquired an idea for the garden that will take many years, if ever, to realise.

Jimmy has greatly enriched my life. He has not simplified it. My fern problem has multiplied. All weeding has to be done by hand. It tends to be accompanied by a sotto-voce monologue: 'Mind that little fern — look, it's a sporeling from Jimmy's famous lady, *Athyrium filix-femina* 'Deficiens percristatum Dyce'. The fronds are only four inches long — I'm not sure yet about the deficient middle — but the crests are swaying unmistakably. It can't stay under that rose. Pot it right away, label and date it.'

Thank you, Jimmy, thank you for a treasury of ferns.

Joan Loraine

NO ALPINE GARDENER

My first acquaintance with Jimmy Dyce was about twenty six years ago when, on moving to Essex, I found I was about ten miles from the Secretary of a Society I had heard about whilst I was exhibiting in the fern classes of the Alpine Garden Society.

I rang him up one day and he invited me to come to his house in Loughton, and there, in his long garden, I was shown more species and varieties than I had ever seen in one place before. At that time he had a wonderful collection of plants of practically all the British ferns, most of them collected by himself.

I thought at first meeting that Jimmy was a single-minded man, centred on ferns, but I was to learn that he was Chairman, or Officer of several local organisations unconnected with ferns; a wine maker of repute, a connoiseur of malt whiskies, a specialist collector of stamps and first day covers, a good cabinet maker, a lover of recorded music with an extensive collection of records, and he also did well with a camera. Never a dull moment for him! I could never get him interested in alpines though; I took him to a group meeting once but he fell asleep! He did, however, judge the fern classes for the AGS on sundry occasions.

At this time, the late 1950's, the Society had only about one hundred members, and the then Secretary was a sick man, so Jimmy was carrying the Society, being both Secretary and Treasurer, dealing with the Gazette and all correspondence, as well as still working at his job in banking.

Because of his accumulated knowledge of ferns, it has many times been suggested he should write a book for the Society, and I believe he has had several attempts at it, but in feeding the earlier Gazettes, the Newsletter that came alongside it, then the Bulletin, he has written enough for a book or two, and imparted a good deal of his knowledge to the members.

Before the Society became too large for one man to handle, Jimmy and I would travel the country for miles, looking for venues for the excursions, and finding out the hard way how difficult it was then to get accommodation overnight in the off-season, before "weekend breaks" were thought of. He is an excellent map reader as well as being able to spot an interesting variety in the hedgerow from a car travelling down a Dorset lane at twenty miles an hour. On a trip across France we rarely used a Route Nationale, he directed me down all the yellow roads on the Michelin maps, and quite a few of the white ones too, but I don't think he saw much of the scenery, until we stopped!

I count Jimmy as a good friend and have enjoyed his company over many years, now geography and age keep us from meeting very often, but I am glad I have been able to help him with the growth of the Society, and congratulate him on becoming the 'Grand Old Man'.

Richard Cartwright

THE FRIENDLY SOCIETY

I think that most of us know how much we, as a Society, owe Jimmy. He revived the Society from extinction, built it up almost to its present numbers and, for many years, ran it virtually single handed.

For all that we are grateful, but for me his great achievement was making it a *friendly* society. In my years as Membership Secretary I have been amazed at the number of members who, although they had never met him, regarded him as a friend. The volume of his correspondence must have been immense. He kept up a personal list of names and addresses throughout the time that he was President and Secretary, and whenever I had a problem from any member, I used to contact him. In an uncanny way he seemed to know them all.

I believe that what he would like to be remembered for is for creating a friendly society. That will be my most enduring memory. Let us hope that we can keep it up in the computer age.

Philip Coke

WHISKY AND FERNS .....

I first met Jimmy Dyce briefly in 1954 — when the Society had the Annual Meeting in Borrowdale (see British Fern Gazette, Vol VIII, No 5, p 115, 1955). I could only spend one day, the Sunday, with the party as I had just taken on a contract to build a dry stone wall in a stipulated time, so I had to get on with it. We were up on Grange Fell above the old Quay Foot Quarry when we both simultaneously spotted a small crested *Athyrium,* it had two crowns so we took one each. Whether or not Jimmy's thrived I do not know, but mine did and grew into a lovely large fern; it turned out to be *Athyrium filix-femina* 'Mediodeficiens polydactylum' — a lovely fern and so it should be with a name like that, as Reg Kaye says in his book, *Hardy Ferns*!

Jimmy and I became very good friends as he is such good company and we both liked a dram of the water of life, otherwise known as Malt Whisky. Jimmy and I often had friendly arguments over ferns, especially over *Dryopteris abbreviata* now called *D. oreades* (ghastly name!). We once spent a great weekend at The Traveller's Rest in Grasmere; I remember it was lovely warm weather in September, we greatly enjoyed ourselves. There was no Scottish Malt so we indulged in the Irish, John Jameson, good stuff! We also had a good weekend at the High Force Hotel in Upper Teesdale with other members of the Society (see Newsletter No 10, p 11, 1972). The landlord here had one of the best stocks of malt I have ever seen, seven different brands. Jimmy and I and others repaired to a little room up the stairs in the evenings and talked ferns — and consumed a fair amount of whisky. We tried them all and then stuck to the one we liked best.

I expect Jimmy remembers the meeting at the Bridge Hotel at Buttermere (see Newsletter No 10, p 15, 1972). We drank all the Glen Morangie, and the landlord had to go to Cockermouth for another six bottles and I think they just about lasted the week. If they did it was not for want of trying!! Oh, for the joys of the days that are gone!

I remember once travelling with Jimmy and telling him how some members were grumbling about the Gazette getting too scientific, he agreed with me but did not say anything else. Not very long after, out came the Newsletter. I am sure it kept a lot of members in the Society who otherwise would have resigned. The Newsletter developed into the Bulletin.

Many happy returns, Jimmy, old friend — Slainte Mhor.

Fred Jackson

(I was present at the two 1972 meetings Fred describes here, and I can honestly say that no-one ever seemed the worse for wear the next morning! Ed.)

SHORTER NOTES

Selaginella: the persistent pteridophyte

Pteridophytes are numerous throughout the entire history of land plants. During this time many highly specialised and unusual forms evolved, but most of them eventually became extinct. Others with a relatively unspecialised morphology persisted for very much longer. Some are still with us today after hundreds of millions of years.

Most of the lycophytes that I have studied over the years have been the larger, tree-sized species that grew in the Carboniferous Coal Measure swamps, but there were smaller plants and some were virtually indistinguishable from living species. *Selaginella-like* plants lived in these swamps showing that little morphological change has occurred in 250 million years. *Selaginellites gutbieri,* figured opposite p. 60 from the Zwickau coal field of the German Democratic Republic, was originally described as having spirals of two sizes of leaf, but I believe it to be truly heterophyllous with the regular two ranks of large leaves and small leaves found in living *Selaginella*. The Carboniferous plants however have rather different spores to the living species. It is for this reason that we use the different, albeit rather similar, generic name.

B. A. THOMAS

Another diagnostic character in Polypodium?

During a brief tour of my garden in sub-zero temperatures early this year, I noticed that the three British species of *Polypodium* responded to frost in different ways:

In *P. australe* the main leaf stems were bent over backwards and twisted through 180°, while the pinnae were rolled inwards as if severely droughted — dramatically altering the appearance of the frond.

In *P. interjectum* the tips of the fronds and pinnae were turned up a little, but the main stem remained more or less erect.

In *P. vulgare* I could detect no visible effect of the frost.

The response of the hybrid between *P. australe* and *P. interjectum (P. X shivasiae)* was indistinguishable from that of *P. australe,* while *P. australe* X *P. vulgare (P. X font-queri)* seemed unaffected by the weather like *P. vulgare*. (Both these hybrids were determined by R.H. Roberts).

These observations were made on 7.1.85 during a daytime temperature of -1.5°C following several nights of frosts with a minimum temperature of -5.0°C the night before. All five taxa are grown adjacent to each other in a bed with equal exposure to the elements — although random checks on each species in more exposed parts of the garden confirmed the responses outlined above.

Following rain and warmer weather in early February, all taxa recovered completely to be their usual adornment in the winter garden.

MARTIN RICKARD

THE DISTRIBUTION AND HABITATS OF EQUISETUM x DYCEI

C N PAGE, Royal Botanic Garden, Edinburgh EH3 5LR

Equisetum x dycei C N Page *(E. fluviatile x palustre)* in an elusive plant which is very much less common than its parentage might at first suggest. It was first found in Scotland in 1963 on the Outer Hebridean Island of Harris, with subsequent finds on Lewis and Rhum. Fieldwork in Ireland during 1984 showed the plant to be present there too in many sites in the west, from Sligo to Kerry, although it has not been found elsewhere in Ireland nor yet in England or Wales. Neither has it yet been found in herbarium material from anywhere else across the broad, north temperate ranges of its two abundant parents.

Its apparent restriction to Scotland and Ireland and, further, to the Atlantic fringes of both, suggests a certain specificity of environmental conditions is essential for its formation and subsequent success, and that amongst these a particular suitability of climatic conditions is probably paramount. All its known sites are in areas of high and frequent rainfall, generally high humidity, and cool and often cloudy summer conditions. Indeed, the overriding impression of the places where it grows are that they are ones characterised by a steady westerly wind and soft, light rain.

Within these areas the plant has been found in a number of damp habitats, including ditches, shorelines of lakes and marshy flushes by streams. Many show some evidence of disturbance of the vegetation either by man or by natural erosion, and it seems likely that some local disturbance is probably essential in the initial formation of this plant. Once established, colonies persist mainly in more open habitats, reducing to scattered shoots where the vegetation becomes more dense.

In almost all its sites, most shoots of the plant adopt a decumbent habit, at least at the base of the plant, probably resulting from the relative slenderness of the main stem inherited from its *E. palustre* parent but with a much larger central hollow influenced by its *E. fluviatile* parent. The branches are usually as slender as those of *E. fluviatile,* but adopt the ascending habit of those of *E. palustre.*

One feature of this hybrid which distinguishes it from most is that it has rather few branches (indeed some shoots are unbranched), and that even well-branched ones have the upper half or more of the shoot ending in a long, simple slender, tail-like portion. Although this feature can help considerably with its initial diagnosis it is something of a mixed blessing, for it means that in the field it is usually extremely difficult to spot. Indeed, when isolated shoots occur amongst other reedy vegetation, and when other horsetails and horsetail hybrids are also present (as they are at most of its sites), *E. x dycei* is certainly the most likely one to be overlooked. In this connection, I am particularly grateful to Clive Jermy, Marian Barker and Heather McHaffie, who, with trained eyes, first rightly recognised it at many of the sites at which it is now known.

Finally, it seems appropriate to mention that this hybrid was named in honour of J W Dyce not only to celebrate his unrivalled period of dedication to the well-being of the British Pteridological Society, but specifically in recognition of his painstaking systematic recording over many years of the distribution of our native pteridophyte taxa. In this connection I am sure he will not have failed to note that the distribution of *E. x dycei* is turning out, as fate would have it, to be not dissimilar to that of the natural range of the malt whisky distillery.

Equisetum x dycei stand in West Ireland (Photo: C N Page)

Selaginellites gutbieri. A. Portion of leafy shoot showing the two ranks of different sized leaves. B. Terminal cones.

Asplenium scolopendrium 'Crispum',
photographed on Mendip, June 1984, by Christopher Potts

ASPLENIUM SCOLOPENDRIUM 'CRISPUM' ON MENDIP

MARY POTTS, 4 Kennel Lane, Webbington, Nr Axbridge, Somerset

I think many of us — particularly the gardeners amongst us — cherish the ambition of finding a really first rate variety of a British fern growing wild. The prints and drawings in the Victorian fern books, the well tried varieties growing in many of our gardens, and the very infrequent discoveries of members, all lead to the supposition that there must be still more undiscovered varieties growing in the countryside. But our discovery of last year proved to be something of an anti-climax and only Jimmy Dyce's unalloyed enthusiasm brought into cultivation what promises to be a really fine new variety.

Residing in a handleless mug on our dresser for many weeks was a frayed and wizened 'scolly' frond. It was not until Jimmy came for his annual visit in July (and was gently e employed in drying up!) that he withdrew the frond from its temporary herbarium and questioned its provenance. I explained that Christopher, while on an abortive dragonfly photography expedition had come upon the plant accidentally, growing in a well known ravine close to our home. As far as I knew the fern was still there, and Christopher had had the presence of mind to take a photograph of it. I showed Jimmy the negative and hardly had time to provide further explanation — I hadn't seen it and didn't know exactly where it was — before he wanted to be off down the garden path.

Despite constant reminders from Jimmy it was not until the next evening that we found time to visit the site and with much relief saw the plant growing as Christopher had found it; neither stolen nor spoilt but much increased in stature despite the dry weather. We had little enough time to admire this pteridological gem before one of our number was upon his knees digging like a well trained terrier. In an unbelievably short time I found myself hugging the largest and finest *Asplenium scolopendrium* 'Crispum' that I have ever seen outside Henry Schollick's garden.

The next day a good hour was spent potting up this wonder after all the available leaf bases had been removed for propagation. I am pleased to report that in October we planted this fern out into the garden. The mild damp autumnal weather suited it to perfection and it produced another three fronds. The frond bases have also grown well and in a few years we should have some more plants of this superb fern for distribution.

SHORTER NOTE

Spores to ferns in one year!

On average I find that spores sown in September one year are healthy young ferns ready for planting out in October of the following year, often with fronds 12 inches long.

My technique is to keep all newly sown spores on a north facing window sill in a heated bedroom. Once the first tiny fronds start to show I prick them out into a seed tray, covered with an airtight plastic bag, each piece being about ¾ of an inch across. I keep them in the heated bedroom until the frosts finish about May, and then transplant each tiny fern into a 3½ inch pot and move it to a cold greenhouse under the staging on a bed of sharp sand. When the roots start to show around the edge of the pot I transfer the fern to a five inch pot containing Arthur Bower's potting compost plus bonemeal. Fern roots being very fine seem to love running through the loose compost and I never use crocks for the bottom of the pot. I reckon they are ready for the open garden when the roots have found their way into the sand — usually during October.

RON KING

ON EXPERIMENTING WITH VARIETIES

PHILIP COKE

For some years I have been growing ferns from spores and, in some cases, mixing spores in the hope of producing new varieties. To some extent, I have been successful and have produced varieties which are, at least, different from any others in my collection. One of my difficulties has been that I am neither a botanist nor a classical scholar and the naming of these varieties has been a problem.

I was therefore delighted, as well as flattered, when Martin Rickard offered to enlist the help of Jimmy Dyce and between them to name some apparently new varieties, and even adding the name 'Coke' in some cases. To have a plant named after one is a much better memorial than a name on a tombstone. Like many other fern enthusiasts I like to talk to my ferns and it is nice to be able to address them by name!

But, seriously, my hope is that this account of my experience will encourage others to experiment and try to reproduce some of the 60% varieties which are said to have been lost since Victorian days. A glance at Stansfield's catalogue, which has been reproduced by the Society and which offered 489 varieties of hardy ferns, will show how far we have to go and the scope that there is for experiment.

I must make it clear that I cannot point to the ancestory of any of the ferns because my method, if it is a method, is just to mix up the spores and hope, but it has been fun.

I was fortunate in that I started with *Athyrium filix-femina* which has an astonishing range of varieties and is a quick grower. It is usually possible to tell within twelve months if there is anything exceptional in a batch. This, in my experience, is in contrast with the Polystichums, which do not seem to develop their final conformation for about three years.

I was able almost in my first year to recognise *Athyrium filix-femina* 'Plumosum Coke' as something special and this encouraged me. *A.f.* 'Plumosum cristatum Coke' came about a year later and was even better. Both are strong growing ferns of about three feet and divide readily. 'Plumosum' has been widely distributed and I have been able to pass on some bits of 'Plumosum cristatum', I hope that Judith Jones has been able to get it established in the USA.

Both varieties produce spores occasionally but results of sowings have been very disappointing. All have reverted to normal cresting with no plumose character.

A.f. 'Percristatum Coke' is a real beauty and obviously an offspring of some crested varieties. I have been cautious about dividing it because I have a similar one, which I did divide, and it has never forgiven me. I must try to get it spread about.

The *A.f.* 'Nudicale-cristatum' varieties keep on cropping up and vary from about eighteen inches in height, which I do not like, to a mere four inches which forms a tight cushion and is most attractive. I wonder if anyone can explain this range of sizes? I did not use *A.f.* 'Minutissimum' in any of my mixes.

Dryopteris filix-mas 'Linearis cristato-pendula' is an extraordinary fern and naming it seems to have caused some difficulty. I think that it must be a cross between a crested variety and *D. filix-mas* 'Linearis'. It did not fully develop its characteristics until rather late and when I found it in a border it gave me something of a shock. In fact it is not really a monstrosity as might appear from the illustration. It does make quite a handsome plant. Martin has a division of it but, as it is a fairly recent 'find', it has not gone any further.

In the same way the Polystichums did not show their true character immediately or maybe it was just through ignorance that I did not spot them. *Polystichum setiferum* 'Divisilobum foliosum Coke' is my favourite. It is a big strong plant, very thick and with a texture almost

like fur. I wonder what the botanical name is for that? It is tough and very reluctant to part with off-sets. Judith Jones had quite a battle with it. I hope the result was worth the effort.

P. setiferum 'Divisilobum laxum Coke' is the most delicate in both looks and constitution. Unfortunately it is not a strong grower. I have moved it three times trying to find a place it likes and, at last, it seems to be doing better. It has been rather hacked about, with my permission, and I hope that it is doing better elsewhere. I did have two plants of it but one mysteriously disappeared so perhaps it is more widely distributed than I realise.

P. setiferum 'Divisilobum congestum Coke' is a small spreading rather stiff divisilobe. There is no problem about reproducing it because it has bulbils all the way up the frond. The original plant is now with Martin.

My 'scollies', of which two are illustrated, must have come from three varieties, one which was sold to me as 'Nobile' but obviously was not, a very small 'Marginatum' & 'Golden Queen'. The golden characteristic is peculiar. I have a number of variagated ones and they stay golden year after year but when I transfer them elsewhere some of them seem to revert to green.

I have recently tried crossing 'Scollies' with *A. trichomanes*. It has produced some interesting sporelings but it is too early to say whether it has been successful.

I have talked a lot about giving away ferns but I have received just as many as I have given. A large part of my collection were gifts especially from Ray and Rita Coughlin and Chris and Mary Potts. One of the advantages of growing from spores is that one always has spares with which to repay a kindness. Sadly one cannot repay kindness in the same way from Australia. I came back from there with about forty ferns, many of them from Ray Best. Their very sensible import restrictions prevent any return in kind.

I do hope that this account will enthuse others to experiment. New varieties must come from amateurs. Commercial producers have to produce ferns to a pattern and botanists are naturally not interested in cultivated varieties.

This is also by way of being a farewell, because I expect to be leaving Robin Hill in the near future. I do not know how many of my ferns I will be able to take with me. Most of them are duplicated elsewhere, notably with Martin and Pat Roberts. I will ensure that any which I cannot take go to good homes.

I am also giving up membership secretary after seven years. I have enjoyed it and have made many friends — some of them only pen-friends — with whom I will hope to keep in touch.

Descriptions of new varieties mentioned in this account

Asplenium scolopendrium 'Ramo-marginatum Coke'. Fronds irregularly ramo-marginate. Branching commencing at frond mid-point with further branching towards tip. Overall appearance being not unlike a deer's horn. Fronds up to 20 cm long.

Asplenium scolopendrium 'Grandiceps nanum'. Dwarf. Fronds branching from near base into crisped, irregularly divided fan. Fronds as broad as long, up to 10 cm long.

Athyrium filix-femina 'Plumosum Coke'. Plumose. Quadripinnate, pinnae broadly lanceolate. Fronds up to 60 cm long.

Athyrium filix-femina 'Plumosum cristatum Coke'. Plumose. Quadripinnate, pinnae broadly lanceolate furnished with tassels. Fronds up to 60 cm long.

Athyrium filix-femina 'Nudicale cristatum Coke'. Dwarf. Basal ¾ of rachis naked. Top ¼ of frond branching repeatedly forming dense head. Ultimate divisions extend into fine points. Fronds up to 15 cm long.

Athyrium filix-femina 'Percristatum Coke'. Sub-plumose, slightly depauperate. Fronds, pinnae and pinnules crested, pinnae crests heavily corymbose. Fronds narrowly lanceolate, up to 50 cm long.

Fig. 1

a) *Polystichum setiferum* 'Divisilobum foliosum Coke', pinna.
b) *P. setiferum* 'Divisilobum laxum Coke', pinna.
c) *P. setiferum* 'Divisilobum congestum Coke', pinna.
d) *Asplenium scolopendrium* 'Ramo-marginatum Coke', frond.
e) *A. scolopendrium* 'Grandiceps nanum', frond.

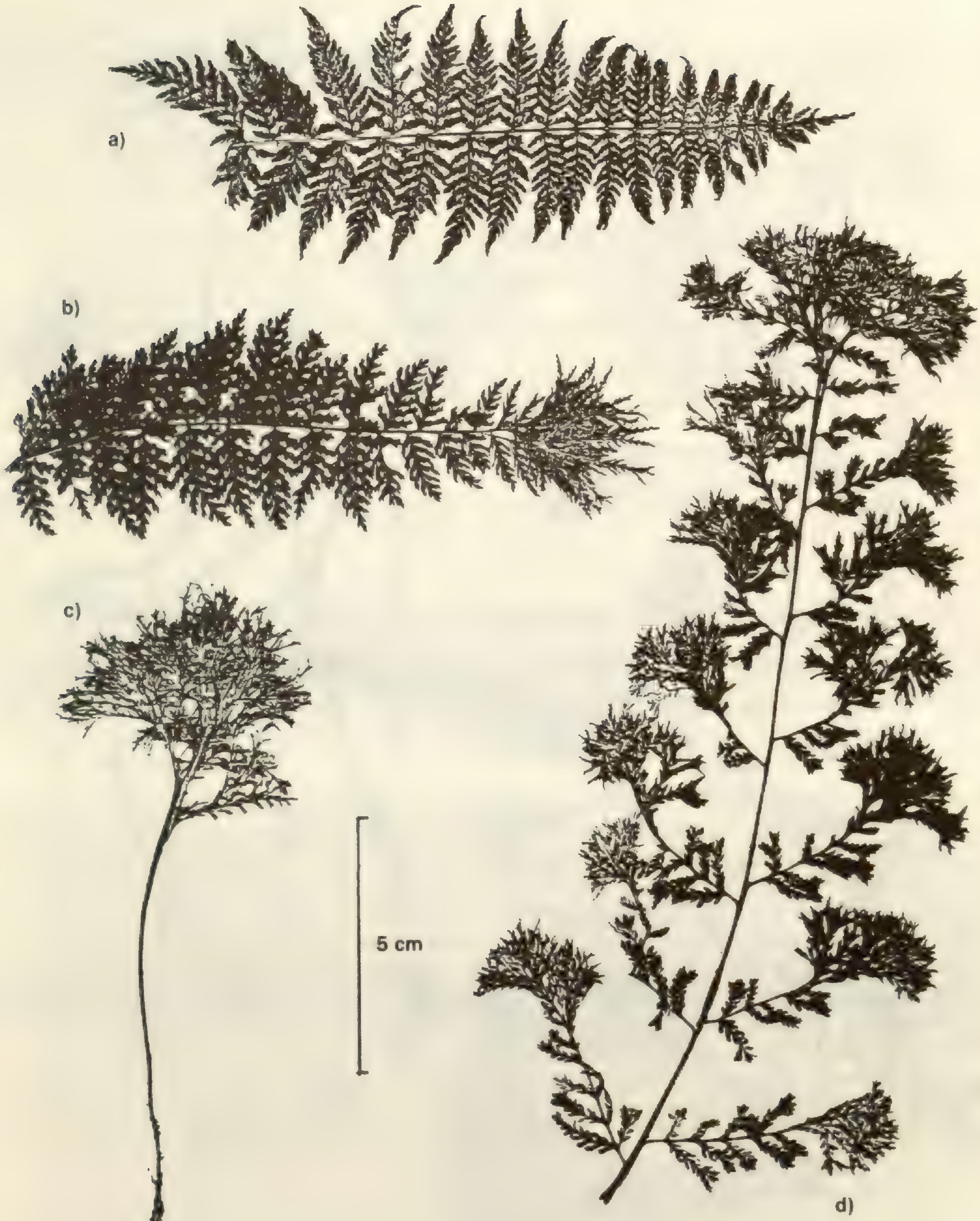

Fig. 2 a) *Athyrium filix-femina* 'Plumosum Coke', pinna
b) *A. filix-femina* 'Plumosum cristatum Coke', pinna.
c) *A. filix-femina* 'Nudicale cristatum Coke', frond.
d) *A. filix-femina* 'Percristatum Coke', top half of frond.

Fig. 3 *Dryopteris filix-mas,* 'Linearis cristato-penula', top half of frond.

Dryopteris filix-mas 'Linearis cristato-pendula'. Pinnules lacking or ill-formed. Pinnae and frond crested. Terminal crest heavy and pendulous. Distinct. Fronds up to 50 cm long.

Polystichum setiferum 'Divisilobum foliosum Coke'. Fronds sub-erect, densely tripinnate, rarely bulbiferous. Divisilobe. Pinnae broadly triangular. Pinnules long with ultimate segments relatively broad giving foliose character. Fronds up to 60 cm long.

Polystichum setiferum 'Divisilobum laxum Coke'. Fronds sub-erect, openly tripinnate, rarely bulbiferous divisilobe. Pinnae oblong-lanceolate of irregular length. Pinnules relatively short and distantly spaced giving open character to frond. Fronds up to 60 cm long.

Polystichum setiferum 'Divisilobum congestum Coke'. Fronds spreading, broadly triangular, densely bulbiferous. Divisilobe. Pinnae crowded, broadly triangular. Pinnules relatively long giving congested form to frond. Pinnule segments narrow. Fronds up to 40 cm long.

All varieties named by Jimmy Dyce, descriptions by Martin Rickard.

ATHYRIUM FILIX-FEMINA 'CRISPUM GRANDICEPS KAYE'

REGINALD KAYE, Waithman Nurseries, Silverdale, Carnforth, Lancs LA5 0TY

This attractive small-growing variety cropped up originally as a chance seedling on the sphagnum top-dressing of a pot of Odontoglossum in my old orchid house (now defunct) about 1948.

The first fronds from the prothallus were a perfect dichotomy, a slender two-pronged fork about 3 cm high. The following year the fronds again repeated the dichotomy, each branch of the fork being itself branched on the same scale, each branch perfectly linear, about 2 mm wide. On repotting the orchid the fern was removed and potted up in normal compost and grown on two or three years before being planted out in the fern garden, when it produced fronds with a large terminal crest, the pinnae being orbicular to deltoid in outline, the larger pinnae dividing near the tips. The plant was divided every two or three years and in thirty years the stock reached the fifty mark when it was put in my catalogue under the above name. Originally, I suggested naming it *A. filix-femina* 'Grandiceps nanum' but was advised under the rules of nomenclature it would have to have a cultivar name. I suggested 'Baby Big-head' but did not get a reply. Anyway it makes a most attractive little plant, the fronds being slightly decumbent making a plant about 20 cm high and 25 cm wide. The maximum length of frond is 27 cm, 5 cm wide, crest 10 cm wide, but the average frond is 20 cm long by 3 cm wide, the crest 6 cm wide. The shorter fronds having the denser heads. The pinnae are slightly deltoid to orbicular, the fronds linear-lanceolate, the lowest pinnae slightly longer than the rest, and forking at the tips. I have never noticed any of the fronds having sori developing, but I have not searched for them and may have missed them amongst the multitudinous jobs needing attention in the nursery. In December the fronds are still green and attractive when most of the Athyriums have lost their fronds. The planting always gives me pleasure when I pass it on the way to a spot of renovation amongst the fern beds, where I have recently removed about 7 cwt mixed roots, acorns, oak seedlings, Ramsons, Celandines, *Anemone nemorosa* — a perfect network everywhere, to say nothing of Yellow Pimpernel, Herb Robert, and Ground Ivy (Glechoma) as well as Ivy itself.

Athyrium filix-femina 'Crispum Grandiceps Kaye'

SOME FURTHER COMMENTS ON 19th CENTURY FERN BOOKS

R E HOLTTUM, 50 Gloucester Court, Kew Road, Richmond, Surrey

In the first issue of the *'Pteridologist'* Nigel Hall wrote about collecting Victorian fern books, mentioning most of those published in Britain. There were important books on the world's ferns published in other countries of Europe, and also a few in Britain not mentioned by Nigel Hall. The object of the present article is to comment on some of them and on their authors' achievements.

One important British author not mentioned by Hall is John Smith who started work at Kew in 1822 and retired, owing to failing sight, in 1865. At an early stage he had charge of the tropical houses at Kew and became interested in ferns. He raised many plants from spores taken from herbarium specimens and soon had a considerable and varied collection. The classification then current was that of the Swedish botanist O Swartz, whose *Synopsis Filicum* appeared in 1806. The genera were mainly defined on the form and position of sori, and John Smith, observing living plants, developed ideas for using other characters. He chose a varied selection of plants illustrating some of his ideas and asked the Kew artist Francis Bauer to make drawings of forty of them. Smith sent the drawings to W J Hooker, who was then Professor of Botany at Glasgow, and this gave Hooker the idea of producing a book on the genera of ferns; he added another eighty plates prepared by Walter Fitch, and the book (*Genera Filicum*) was published, in parts between 1838 and 1842, as mentioned by Nigel Hall. When Hooker became Director at Kew, John Smith became Curator, in charge of all horticultural work. Hooker continued his study of ferns and, by correspondence with people in many parts of the world, assembled a very large collection of dried specimens on which he mainly based the five volumes of his *Species Filicum.* Through this interest of Hooker's, John Smith was able to obtain many more living plants and also to raise some from spores from herbarium specimens. About the time he retired he published a book entitled *Ferns, British and Foreign* (1866) in which he enumerated one thousand species which he had seen in cultivation, with an introduction on culture and classification. After his retirement he wrote another book which he called *Historia Filicum* (1875), illustrated by Walter Fitch, in which he presented his final thoughts on fern classification. He was critical of Hooker's work which was based almost entirely on the study of dried specimens; subsequent study by other people has shown that Smith's criticism was justified, but his book received little attention from academic botanists.

A work by Thomas Moore not mentioned by Nigel Hall is his *Index Filicum* (1857-62), an attempt to enumerate all published names of ferns with corrections to bring them into conformity with Moore's classification which he set forth, with illustrations, as an introduction to his Index. The work was published in parts, and never completed, but the illustrated introductory part is of historical interest and the well-executed drawings show details of structure which Moore considered to be of generic importance.

The first considerable series of published illustrations of ferns was by C Schkuhr at Wittenberg between 1804 and 1809, entitled *Kryptogamische Gewächse.* His drawings are important in establishing the identity of some species (notably those of Forster, based on specimens collected during Cook's second voyage) and they include details of the structure of hairs which Carl Christensen, a century later, showed to be important as guides for distinguishing species allied to *Dryopteris* from those of the *Thelypteris* alliance which were confused by all authors of the 19th century.

In 1822 C L Blume was appointed Director of the recently established botanic garden at Bogor in Java. His appointment (and the post of Director) was terminated in 1826 but in those few years he undertook much field study and wrote the descriptions of a large

number of local plants, especially orchids and ferns. On his return to Holland he was appointed Director of the Rijksherbarium, and from that time onwards published more detailed descriptions illustrated by some of the finest coloured plates produced at that time. His sixty-five folio plates of ferns, part of his *Flora Javae,* were published in 1829-30; at various subsequent times he added more plates to a total of 96. In my judgement, no finer illustrations of ferns have ever been produced.

In 1836 the Czech botanist C B Presl published an elaborate new classification of ferns entitled *Tentamen Pteridographiae,* illustrated by small engravings which showed the details of venation of newly proposed genera, but his excessive reliance on vein-patterns brought together ferns which are now seen not to be nearly related. However, many of the names in his book are still in use today. He continued to describe many further genera and species, including the first detailed treatment of the filmy ferns. Another account of filmy ferns, differently subdivided and confined to those in Java, was by van den Bosch; it includes 52 plates and is still of basic importance.

Simultaneously with Presl, the German botanist Gustav Kunze, who had charge of the botanic garden at Leipzig, produced a series of beautiful coloured engravings with well-observed descriptions in a small quarto format with the title *Die Farnkräuter in kolorierte Abbildungen,* published in parts between 1840 and 1851. At that time the garden at Leipzig had the most comprehensive collection of ferns in Europe; this was later excelled only by Kew under John Smith.

Kunze's successor at Leipzig was Georg Mettenius, a man of great energy who, simultaneously with W J Hooker, published descriptions of all known species in several fern-genera; he noted significant details not observed (or not thought important) by Hooker. In 1856 he produced a folio work, with many engravings, in which he set forth a new classification of the world's ferns; this was entitled *Filices Horti botanici Lipsiensis.* In my judgement, Mettenius had a better understanding of the world's ferns than any other 19th century author. Unfortunately he died of cholera at the age of 42 in 1866; if he had lived longer he would certainly have changed radically the course of pteridological thinking. Radical new thought came forty years later with Carl Chistensen.

Another author working simultaneously with Mettenius was A L A Fée of Strasbourg who published eleven Mémoires on ferns from 1844 to 1866, also two volumes on the vascular cryptogams of Brazil in 1869-1873. Nearly all Fée's works were illustrated by excellent plates, the finest being the 64 large folio plates illustrating his second Mémoire (1845) on acrostichoid ferns. The fifth Mémoire (1852), entitled *Genera Filicum,* is a survey of all known ferns arranged in a complex new system which showed less insight than that of Mettenius; it is illustrated by plates showing details considered important by Fée, and is still important.

R H Beddome, a forester stationed for most of his service in southern India, collected ferns during his travels and in 1863-64 published, at Madras, descriptions of them with more than 200 line drawings on quarto plates. He also acquired a herbarium of specimens from northern India and in 1865-70 published another series of more than 300 quarto plates entitled *Ferns of British India.* Though details are not in all cases quite accurate, and though we may today recognise details not illustrated as important, Beddome's plates are an admirable series, illustrating Indian ferns far more fully than those of any other tropical country. After retiring he spent some time at Kew studying Hooker's fern herbarium, correcting some of his identifications and revising his nomenclature, and in 1883 published his *Handbook to the Ferns of British India,* including reproductions (reduced in size) of many of his earlier plates. Like John Smith, he knew ferns as living plants; his preface shows that he knew that a better classification was needed.

Almost at the end of the century came two more works on the world's ferns. The first was *Die Farnkräuter der Erde,* by Hermann Christ of Basle, in 1897. Christ was a legal man by

profession, who had made considerable studies of the Swiss alpine flora. Rather late in life he began to take an interest in ferns and described several collections from China and elsewhere. He wished to devise a classification better than Hooker's (which was still used by J G Baker at Kew). But in my judgement his scheme shows less insight than that of John Smith, whom he does not mention, and Christensen soon afterwards began to show more clearly Hooker's inadequacies.

The other work was the Pteridophyte volume in Engler & Prantl's *Die Natürliche Pflanzenfamilien*, in which most of the ferns were dealt with by L Diels. Diels had little previous knowledge of ferns and attempted to make a summary from previous publications. But he never understood how confused were the 19th century generic concepts and evidently did not know of some important late papers by Mettenius. In my judgement his work, in the main, is confusion worse confounded, but it has some good illustrations.

SHORTER NOTE

Dryopteris thymifolia = Lady-fern

Last year I visited Liverpool International Garden Festival for one day in July and helped Leslie and Joan Dugdale to man the BPS stand (see *Bulletin* 3: 29, 1984). Next to us was an exhibit of ornamental garden metalwork, amongst which were potted ferns labelled *Dryopteris thymifolius* (sic) for sale at £2.40; they were in fact *Athyrium filix-femina*. Despite enquiries to the exhibitors and their suppliers, and thence to two other supposed suppliers, and also consulting BPS botanical and horticultural experts, I have failed to find the source of the name, but have found that names are contrived for trade purposes when, for example, a consignment arrives without a label. So it seems an honest expedient can launch a new name which, if done without legal formality, is illegitimate. Whoever invented this name thought it was *Dryopteris* so, understandably, 'thyme-leaved' was apt for the finer cutting of a Lady-fern.

This experience prompts me to say that I have every sympathy with those who complain about the Rules of Nomenclature, and that I agree that losing familiar latinized names for legal reasons often loses the meaning of what the plant looks like. I suggest that, for example, *grandiceps* be re-cast as 'Grandiceps', thereby regarding it as a vernacular name and retaining what we know as meaning a big head.

I would like to think that the BPS could convene a get-together on these matters, hopefully to pursue and develop ideas outlined in *Fern Gazette* (1964), 9: 178-182 and later plan to up-date and extend them.

JIM CRABBE

EQUISETUM × FONT-QUERI IN SHROPSHIRE

C. N. PAGE, Royal Botanic Garden, Edinburgh, and
A. R. BUSBY, University of Warwick, Westwood, Coventry.

During a weekend introductory course on ferns led by one of us (ARB) organised by the Field Studies Council at the Preston Montford FSC, several sites were visited in Shropshire to illustrate the range of habitats for ferns in that area. One such habitat is the disused Montgomeryshire/Shropshire canal link south of Oswestry. This canal, opened in 1793, primarily to service the local farming community, carried limestone from the quarries at nearby Llanymynech to the lime kilns at Belan. The canal also carried coal, grain and timber. It appears to have been abandoned during the early nineteen fifties and has now become an attractive linear wetland through north-west Shropshire. The deep canal locks near Queens Head on the A5 now provide an ideal home for several spleenworts.

Alongside the canal runs an old towpath now improved to take vehicular traffic to a nearby canal cottage. The canal and its towpath are raised several feet above the surrounding countryside which was once largely marshland (Maesbury Marshes) but is now improved grassland for cattle and sheep. Along this canal and its towpath are abundant quantities of *Equisetum telmateia* and *E. arvense,* while nearby in the canal itself, small quantities of *E. fluviatile* grow.

During a visit by the weekend fern class, several shoots of an unusual horsetail were found in the grassy bottom of a field hedge alongside the canal (GR 33/3326). Long, graceful shoots of this plant were lying almost horizontally in the grass, with their branches ascending and many with each branch ending in a small cone. The branches were the same colour as those of *E. telmateia,* and the main shoots pale ivory white as in that species, but the stems were very much more slender. Material was sent to one of us (CNP) at Edinburgh who confirmed it to be *Equisetum x font-queri* Rothm., the unusual hybrid between *E. palustre* and *E. telmateia.* This hybrid has been known with certainty in Britain previously only on Skye and in Worcestershire (Page 1973, Roberts & Page 1979).

A second visit to the site in mid-August provided more material of the hybrid and showed it to be present on both sides of the towpath track for a distance of about 10 yards (c. 9m). Here, the shoots were of more typically upright form and non-fertile ones were present too. Scattered shoots of *E. palustre* also occurred beside the track, and the soil around the hybrid was considerably basic, with a pH of 7.5.

The presence of the hybrid here with both parents growing nearby suggests that it has arisen locally at this spot by direct hybridisation between the two parents at some time in the past. In this case, the time would appear likely to have been during or immediately after the construction of the canal banks themselves, with habitat disturbance at the time and undamaged persistence of the site since, being significant factors in its continued occurrence here.

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FERNS IN EUROPE: SOME ADVANCES SINCE 1965

A.C. JERMY, British Museum (Natural History), Cromwell Road, London, SW7 5BD.

Twenty years ago the publication of volume one of *Flora Europaea,* (Tutin et al. 1964) gave us a review for the first time this century of the pteridophyte flora of the continent as a whole and we could begin to understand the interrelationships of species across its range from Portugal to the Urals and from Sicily to northern Scandinavia.

Stimulated by this broader outlook then present in Britain, the B.P.S. made in 1965, its first (and only, I am sorry to say) overseas excursion — to Austria. The event was a memorable one. It was expertly organised by the then Meetings Secretary, Peter Halligay, and needless to say, Jimmy Dyce, then Secretary and Treasurer, was very much to the fore encouraging everyone in the party to understand the new but closely related ferns. The account was published in full in the *Gazette* (Vol. 9: 288-295; 1966), and is well worth reading. Although we have never organised another excursion abroad Jimmy Dyce has encouraged many of us to search further afield. So in this issue in which we are commemorating his eightieth birthday I think it might be pertinent to review how our knowledge of the taxonomy and distribution of European ferns has developed over the past 20 years. It is also topical as we are preparing to advise and help compile the pteridophyte accounts for the second edition of *Flora Europaea.*

It is inevitable that as groups are revised and botanists unearth more material in the museums and herbaria, new names for plants well known, will find their way into the literature. We all hate name changes and I will not dwell on the many papers that have been written, even since 1964, on the nomenclature of European ferns; a definitive list of over 170 species found in Europe (with extensive synonymy) is being prepared (Jermy & Moss, in prep.).

An important adjunct to *Flora Europaea* is the *Atlas Flora Europaeae* (Jalas & Suominen, 1972) and again vol. 1 contains the Pteridophyta. This is a project which arose from the corporate planning which was then developing in European science and is directed from Helsinki University. It gives the distribution in Europe, on a 50-km grid basis using the Universal Mercator grid. Regional botanists provided information and country coverage is therefore variable in accuracy and detail, but the overall pictures of distribution are a fair guide and country distributions quoted in *Flora Europaea* are updated in many cases. Another important work is the *Med-Checklist* (Greuter, Burdett & Long, 1984) published under the auspices of the Organisation for Phyto-taxonomy in the Mediterranean Area (OPTIMA). This gives the distribution of all species (and subspecies) of pteridophytes in the Mediterranean area (including N. Africa) on a country by country basis, complete with references to new records. The most recent international project, the European Documentation System, based at Reading University under Prof. V.H. Heywood, aims to set up and maintain an on-line computer data base on European vascular plants compiled from *Flora Europaea* and later floristic literature.

So much for organised corporate efforts but what of individual fieldwork, recording and experimental research? Within months of *Flora Europaea* appearing a completely new class of plants was added to the flora. Mrs. Betty Allen, who has spent much of her life in Malaysia found in S. Spain a tropical species, *Psilotum nudum,* on a south-facing cliff in cork-oak woodland near Algiceras. This was indeed an exciting find and a substantial extention from its nearest locality in Cape Verde Is. some 2800 km away. It is a fern-ally known to growers as the Whisk Fern, and common in botanic gardens often becoming a weed in the greenhouse.

In the clubmosses the only genus that has come under revision is *Diphasiastrum (Diphasium* of *F.E.)* where Kukkonen (1967) has indicated several subspecies and

varieties in Europe and supports the view that *D.* x *issleri* should be regarded as a hybrid *(alpinum x complanatum),* albeit with partial fertility. My own investigations on British material indicate that at least our lowland populations in the south of the country (now extinct) and a small population near Malvern appear to be this hybrid, but I am not sure about the Scottish material recorded in the *Atlas of Ferns Brit. Is.* (1977). It raises the question: did we also have *D. complanatum* once on lowland British heaths.

The genus *Isoetes,* with some 14 taxa in Europe, has been studied in detail in France (Berthet & Lecocq 1977) and Spain (Prada 1983) when scanning electron microscope pictures have been particularly helpful in showing spore differences. *Isoetes* is an ancient genus and European species now need to be studied in conjunction with those of Africa.

Considerably further study has been made on understanding relationships in the Lip-ferns, *Cheilanthes.* This is another ancient group possibly evolving in the Cretaceous Period in Africa, when it was part of a larger continent called Gondwanaland, and was for many millions of years as far as can be ascertained a relatively dry area. Seven species have now been accepted in S. Europe with a further two in Madeira and the Canary Isles all well-adapted to the rainless summer. An interesting paper by Vida et al. (1983) explains for the less specialised reader how four diploids have crossed to give rise to three tetraploids. They also give silhouettes of species and hybrids. These authors prefer, as others have done to separate two species, *C. marantae* and *C. vellea* and place them in the genus *Notholaena* on the grounds of them lacking a distinct pseudo-indusium, i.e. a modified reflexed leaf-margin, which the other species have. Their spore-wall patterns are also very different from the other *Cheilanthes* and eventually they may be accepted in a genus of their own, as has already been proposed by Spanish botanists. Their closest allies may be not in Africa or Asia but S.W. U.S.A.

There is still a certain amount of study needed to sort out the relationships of the Polypodies of the *P. cambricum (P. australe)* complex in south-west Europe. The Canary Island species *P. macronesica* has been reported for S. Spain (as a subspecies of *P. cambricum; P. azoricum* has yet to be confirmed for the mainland.

In the Thelypteridaceae, the British species of *Thelypteris* s.l. have for some time been accepted in the smaller genera now accepted throughout the family but two further genera are found in Europe namely *Stegnogramma pozoi (Thelypteris pozoi),* restricted on mainland Europe to N. Spain, and *Christella dentata (Cyclosorus dentatus)* which is a tropical species now recorded for S. Spain, Sicily and Crete.

The Aspleniaceae have seen perhaps the greatest revision due mainly to the work of Professors J. Lovis and T. Reichstein, although the late Dr. Dieter Meyer of Berlin made a significant contribution; see *Berichte Deutsches Botanik Gesellschaft,* now *Willdenovia,* 1960-79. Lovis has studied for many years the variation in *Asplenium trichomanes* and in 1964 published a further diploid subspecies, *inexpectans,* originally from Austria, Yugoslavia and Greece, and confined to limestone; more recently it has been found in France, the Balearic Islands and Crimea (Greuter et al. 1984). *A. csikii,* mentioned in *Flora Europaea* as needing further investigation has been renamed as *A. trichomanes* ssp. *pachyrachis,* from an old varietal name for the plant (Lovis & Reichstein 1984). *A. ruta-muraria* is another species found to have a diploid race (ssp. *dolomiticum*) which was originally described from N. Italy; it has since been found in France and Yugoslavia. Likewise *A. petrarchae* was also found to have a diploid form (in S. Spain) but in all these three species the higher chromosome races are due to duplication of chromosome sets (genomes) and the morphological differences between diploid and tetraploid are very small indeed.

In some other species of *Asplenium* in Europe it is clear that tetraploid species have formed from the hybridization of two quite different diploid species. *A. majoricum* is one such species in which the relationship was not clear in *Flora Europaea* and has since been

shown to be a distinct tetraploid species. *A. balearicum,* another tetraploid species since described by Mrs. T.G. Walker (Shivas 1969), proved to be a hybrid between *A. obovatum* and *A. onopteris,* initially thought to be endemic to the Balearic Islands but recently reported for Italy. Studies in the flora of Crete during the last two decades (see Reichstein et al. 1973 and Brownsey & Jermy 1973) have brought to light interesting new species in this genus. *A. aegeum* an attractive diploid of limestone since found on mainland Greece and *A. creticum* (tetraploid from *aegeum* and *viride*) were described in the work just mentioned. Species from central Asia and Turkey, *A. bourgaei* and *A. haussknechtii,* have since been recorded in Crete. The latter species is now regarded as a subspecies of *A. lepidum,* a species of S.E. Europe (Brownsey 1976). Dr. Anne Sleep (1983) illustrated (with excellent silhouettes) the interrelationships of ten species of *Asplenium* found in S.W. Europe and is well worth looking at.

We have accepted for some time the merging of *Ceterach* and *Phyllitis* with *Asplenium* on the grounds that hybridisation occurs between them and that a few species have mixed characters and are difficult to segregate. Similarly the Spanish genus *Pleurosorus* may also be amalgamated on the same grounds. An interesting dwarf form of *A. scolopendrium* with crenate or incised fronds (again from Crete), hitherto called *Biropteris antri-jovis* was shown (Vida 1972) to be related by cross-breeding experiments to *A. scolopendrium* (at subspecies level). There is no doubt that *Ceterach* and *Phyllitis* are distinct plants and many will want to keep these names at generic level as has Chris Page in *Ferns of Britain and Ireland.* It is a matter of opinion and convenience — no rule-book applies in such cases — but as both contain few species there is little to be gained in my opinion in segregating them.

Our knowledge of the Brittle-bladder Ferns, *Cystopteris,* has increased since *Flora Europaea* due mainly to the work of Prof. G. Vida of Budapest. We now accept *C. regia* as a distinct species with finely dissected fronds of limestone rocks of the Alpes, and Vida has shown (1974) that at least three *C. fragilis* 'species' occur which can and frequently do form sterile hybrids. There is much to learn about this group; so far no diploid plants have been found in Europe, but plants with four, six and eight sets of chromosomes have.

The other large genus which has received much attention since 1964 is *Dryopteris.* Now some 17 species are found in Europe, of these five being new to science. The Iberian peninsula is an area which is renowned for its ancient flora; it was in that portion of Europe, then somewhat larger, that the temperate species were confined as the major Pleistocene glaciations spread south around the northern hemisphere. From there several species colonised the newly-formed Atlantic Islands and, as Spain became too dry, now exist as rare endemics on Madeira and the Canary Islands or as relict populations on the wetter seaboard of the peninsula. It was therefore exciting when having described a new *Dryopteris (D. guanchica)* from the Canaries (Gibby et al. 1977), an identical specimen was found in the British Museum herbarium which had been collected from the western tip of Portugal in 1845. The idea of refinding after over 100 years a member of the Tertiary flora of Europe was indeed a challenge and the author, Mary Gibby and Jimmy Dyce went to Portugal in 1975, and did indeed find *D. guanchica* in an enclave of natural vegetation in the urban area of Cintra. It has since been found in N.W. Spain in greater quantity.

C.R. Fraser-Jenkins, who has made brief but frequent and productive excursions to many parts of Europe, has contributed most to our recent knowledge of *Dryopteris.* Much of his collection grown on at Chelsea Physic Garden has been studied cytologically by Gibby; reference should be made to Fraser-Jenkins (1982a; 1982b) for an extensive account on Iberian and Azores *Dryopteris.* One new species found by Fraser-Jenkins in 1981 in the Spanish Cordillera Cantabrica, is named *D. corleyi* after that doyen of *Dryopteris* collectors, Hugh Corley, and is particularly interesting because it appears on morphological grounds to have *D. aemula* in its ancestry.

Another group of species which has undergone considerable study and is very difficult to distinguish is the *D. pallida* group in which may be included *D. submontana* and *D. villarii*. These are limestone plants throughout their range. *D. submontana* is found in Britain (previously recorded as *D. villarsii*), N. Spain and a few isolated sites through the Alps to Hungary; *D. villarii* is now restricted to a species common in the W. Alpes. *D. pallida* itself is very variable, reaching Spain only in the Balearics but it is found eastwards to the Caspian Sea area. It appears to have hybrised with *D. oreades* to form a new species. *D. tyrrhena*, described in 1975 (Fraser-Jenkins, Reichstein & Vida 1975). This is found in the Mediterranean area from S.E. Spain to Liguria in Italy.

In 1964 we realised through Professor Manton's work that *D. filix-mas* had been formed through the hybridisation of *D. oreades (D. abbreviata)* with another then unknown Male-fern. That ancestral parent, *D. caucasica*, was found by Fraser-Jenkins (1976) in the Russian Caucasus and later shown to be in European Russia and the Crimea thus adding a further species to the European list.

D. affinis (D. pseudomas) aggr. is the last major complex that is still in need of detailed taxonomic study. Basic work has been carried out by Dr. J.J. Schneller (1975) and Mary Gibby is investigating the cytology of British material. Fraser Jenkins (1980) has listed a mass of names at all ranks but the resulting taxonomy is as yet far from clear. *D. affinis* is agamospermous (i.e. it can produce a sporeling on the prothallus without fertilization occurring), but it can also produce sperm which can fertilize other closely related species. The resulting hybrids are also agamospermous and can thus get easily established. One such 'species', *D. remota* of the Black Forest which probably has *D. expansa* as the other parent, has long been known. Another, *D. ardechensis*, confined to S.W. France, could be *affinis* combining with either *D. tyrrhena* or *D. pallida*. This ability to hybridise and remain fertile is one of the reasons why *D. affinis* is a taxonomic muddle.

This has of necessity been a very brief review of the major changes seen since 1965; a complete bibliography alone would fill this journal by itself and I have referred only to a few more substantial papers. I have indicated above the two outstanding areas needing further research, viz. *Dryopteris affinis* and *Cystopteris* but there is still the ancestral parent of *D. carthusiana* to find, and it could well be in Europe, and Fraser-Jenkins has shown that completely new tetraploids, e.g. *D. corleyi* may turn up. N. Spain should be on our list for an excursion before too long. Certainly there is the potential in the number of 'uncombined' diploid plants for more tetraploid species to be formed by hybridization in *Asplenium, Cheilanthes* and *Dryopteris*. There is still a lot of Europe to be searched.

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BOOK REVIEW

FLORA OF JERSEY by Frances Le Sueur, Société Jervaise, 1984. p xlii, 244; 18 col. pl.; 18 black and white photographs; 10 maps; 577 species maps; 275 × 215mm. Price £17.50 plus £1.50 p. & p., available from Société Jervaise (Flora), 9 Pier Road, St. Helier, Jersey, Channel Islands. Make cheques payable to Frances Le Sueur.

Anogramma leptophylla – the Jersey Fern .... it is primarily this species which should make the publication of a new Flora of Jersey a significant pteriodological event, and the author has not disappointed us. Of over 1500 species listed in this handsome book the Jersey Fern gets very comprehensive coverage, probably as much as any other species. There is a splendid full page colour painting of the fern in its normal habitat, plus a cartoon and some light-hearted references to 19th century pilgrimages to see the fern. In the main body of the book there is of course a full account of its current distribution shown by the now traditional dot map. For me it is reassuring to see that *A. leptophylla* is now more widely distributed than it was according to the 1903 flora by Lester-Garland — when it seemed to be declining. *A. leptophylla* is also recorded from Guernsey but there it is believed to have been introduced. It is not known anywhere else in the British Isles.

Of course other ferns occur on Jersey, but apart from *Adiantum capillus-veneris* none are nationally rare, although one, *Asplenium billotii,* is as abundant here as anywhere else in the U.K. Of more interest perhaps are the species which do not occur on the island — these include *Polystichum aculeatum, Polypodium vulgare, Oreopteris limbosperma,* the british *Hymenophyllums* and *Equisetum telmateia* – presumably the climate is too soft. On the other hand why do several Guernsey rarities not occur on Jersey; e.g. *Ophioglossum lusitanicum, Isoetes hystrix* and *Asplenium x sarniense* (why is the last hybrid given the common name of 'A hybrid fern' when it has been called 'Guernsey Spleenwort' since its discovery in 1971? Could this be inter-island jealousy!?)? Another problem is the apparent absence of *Polypodium australe* (unfortunately now widely called *P. cambricum*).

Overall this is a fascinating book incorporating many of the features of a county flora. The plant catalogue is very full and accounts of most ancillary areas (e.g. geology, climate, habitats, etc.) are adequate, if brief. For me the only serious short-coming of the whole book is the lack of a map of the islands showing standard features such as towns, villages, etc.

At £17.50 it is not cheap, but it is an attractive book with 18 splendid colour plates of various Jersey specialities. It will be an invaluable guide to any pteridologist, botanist or interested tourist visiting the island.

MARTIN RICKARD

NEW FERN VARIETIES — WILD AND CULTIVATED

J W DYCE, 46 Sedley Rise, Loughton, Essex IG10 1LT

It is some years — 1980, to be precise — since I last wrote under this heading in the *Bulletin*. Much has happened since then, and I have now retired from most of my active participation in the affairs of the Society and tend to become somewhat lazy where writing is concerned! However, Martin Rickard, our Editor, won't le me "sleep" and has successfully prodded me into action again to continue this series of articles. This has entailed quite a bit of memory flogging on the part of both of us and I cannot promise that all the good finds of the last four years, both in the wild and in the spore-pots of our active breeders, will be mentioned. I shall be most happy to hear from anyone who has found or knows of a new outstanding variety, preferably sending me a pressed frond.

To me, the outstanding wild find of 1984 was a first-rate plant of *Asplenium scolopendrium* 'Crispum', found by Christopher Potts at the base of a roadside dry-stone wall in the Cheddar area. It was collected while I was staying for a few days with Christopher and Mary at their home near Cheddar. It is a youngish plant, probably not more than six to eight years old, and the amazing thing is that it remained undiscovered for so long, a few feet away from a busy road. It is a classic example of the variety, with barren fronds of normal width, deeply and regularly frilled. Mary Potts is busy propagating it from frond bases, and I hope to have my own plant of it in due course. It goes without saying that our Editor has also been "drooling" over it and is also lining up impatiently in the queue!

While preparing this paper I heard from our member Peter Corbin who lives in Devon. Several years ago he found three 'Crispum' harts-tongue ferns which he exhibited to us during a meeting in the West Country. Now he has found another one, but so far I do not know how it compares with the Potts' specimen — it will have to be superlative to beat that. Peter says it was growing on top of a bank and was nearly dislodged by hedge-trimmers. He adds it is interesting to note that all the wild 'Crispums' he has found were growing well up on hedge banks or walls. He is sure "that Scolopendrium variants, as a whole, are altogether more frequent in peripheral habitats/situations rather than in the optimum habitats where lots of large lush typicals occur". From my own experience, I fully agree with this statement.

Another exciting find of the past year, although probably not one to stir the blood of many fern growers, was a Crested Bracken, *Pteridium aquilinum* 'Cristatum' which has appeared in the wild woodland garden of Pat and Eric Roberts in Surrey. When I saw it last year it had a single frond only, about a foot high, and the pleasing thing about it is that a rarity of this notoriously difficult — if not impossible — fern to transplant, has actually chosen, of its own accord, to make its home in the protected conditions of a garden where it can be assured of interested care and attention. Crested bracken is only recorded from a few localities, chiefly in the North of England. The best ever find of this variety was a magnificent crispate and percristate form, by C T Druery in mid-Scotland. There was only one frond and it would have been hopeless trying to dig up the root which was probably some feet down in the ground — all he could do was collect the frond which was about 3 feet high and as much across. Those who possess Druery's *British Ferns and their Varieties* will find the frond depicted on page 221. Perchance that plant is still growing somewhere near Pitlochry — if only we knew *where*! What a find!

During the Lakeland meeting last year Martin Rickard found an interesting plant of *Oreopteris limbosperma* 'Revolvens', with recurved pinnules. It is small and looks promising. The remarkable thing about this species is that at one time it was one of our most generous producers of varieties, particularly in the Lake District, and did much to fire the enthusiasm in that area for fern hunting and collecting which was instrumental in launching our Society in 1891. During the inter-war years, if not before then, variation in

O. limbosperma completely disappeared, both in the wild and in cultivation. In post-war years, only two minor variations have been found, both by Martin Rickard, the 'Revolvens' mentioned here, and a 'Cristulatum' which has minute twisted cresting.

Two *Blechnum spicant* finds have come to my notice, a 'Multifidum' by Ray Smith who lives at Shirley in Warwickshire, and a 'Corymbiferum' by Clive Jermy; the latter find was made during the Irish meeting last year. I do not have any details about either plant, but I hear that the 'Corymbiferum' has since died!

These are all the *wild* finds which Martin and I could gather together for this article, but we are sure there must be many others — if only the finders could be prevailed upon to inform us.

There is no reason why this article should not include what can be termed "spore-pot finds". A small number of dedicated members are active in the breeding field, and in the 1983 *Bulletin* I reported how Ray Coughlin had been successful in recovering from the past the famous Victorian variety of the lady fern called 'Kalothrix'. In the same issue (page 268) Martin Rickard had a similar success from the same parent, *Athyrium filix-femina* 'Plumosum Penny'. I have a plant from Martin's sowing and it conforms well with 'Kalothrix Coughlin'.

From the Coughlin "stable" I possess two lady ferns of which I am very fond. One is a cross between 'Setigerum' and the well-known 'Victoriae', in which the beautiful crossed and crested pinnae of the latter are still further enhanced by the fine spininess of the former's setigerate pinnules. The other is a finely divided first-rate plant which the raisers regard as one of their best achievements and have named 'Lydiate' — they live at Lydiate Ash near Bromsgrove in Worcestershire.

Another prolific breeder of new varieties is Philip Coke. He has produced some superb plants of *Polystichum setiferum* 'Divisilobum' and he has an exciting collection of his own varieties of *Asplenium scolopendrium,* several well-worth naming. His greatest successes, however, have been with *Athyrium filix-femina.* I will not comment on these since this issue includes an article dealing with some of his finest ones.

Judith Jones from Seattle in the USA is also very busy breeding new fern varieties in her small nursery. The lady fern gives her some of her best successes, such as a 'Recurvo-cristatum' with the pinnules recurved, and several good 'Grandiceps'. She has also had some very interesting dwarf forms of *A. f-f.* 'Minutissimum'.

P. setiferum breeding has not been neglected and there have been a few reported finds of spores on 'Plumosum Bevis', that most beautiful variety which only very occasionally deigns to produce a few minute spore-heaps which have to be searched for closely, preferably with a magnifying glass. Unfortunately, the resultant sporelings are mostly very "miffy" and need a lot of care to nurse them into mature plants. In recent years I have not heard of anyone who has succeeded in bringing on sporelings of this variety beyond the early stages. Last year I was presented with a sporeling, about 2 inches high, from our Dutch member Cor van de Moesdijk who had made a successful sowing from 'Bevis'. I have not heard how Cor's plants are faring but my one is doing well and was still growing vigorously when last I saw it before it was covered by snow! However, it is still very young, and too early to say if it will turn out to be one of the elite, such as 'Gracillimum' or even 'Gracillimum cristulatum' — or one of the "miffy" ones which will have had enough of life before this year is out!

(Cor has sent me fronds of several different forms raised from his 'Bevis'. Included are some 'Gracillimums'. Hopefully, in time we will be able to run a feature on how these plants develop. A small frond of 'Gracillimum' is illustrated on p. 80. Ed.)

I finish with a species, *not* British but well established in this country, *Cystopteris bulbiferum.* While staying with Pat and Eric Roberts last summer, I was taken to visit the

garden of a friend of theirs, James Platt. It is a small garden but crammed full of beautiful and rare plants. He has a small but good fern collection which includes some plants of a fern which was new to me. It was a variety of *C. bulbiferum* with finely divided and enlarged pinnules, but Mr Platt could not give me its history. On the assumption that it has not already been named somewhere, I suggested a suitable name would be 'Inciso-lacerum' which describes it well. It was generously presented with a fine large plant of the variety, the only one I know of in this species.

Fig. 1 *Polystichum setiferum* 'Gracillimum' sporeling.

PTERIS CRETICA 'IN THE WILD'

PAULINE BASSET, East Rand, Polgooth, St. Austell, Cornwall, PL26 7AX

These ferns grow under the shelter of a thickly ivied wall and an oak tree in a wooded valley about two miles from the coast of St. Austell Bay. Nearby a stream winds its way to Pentewan. The hill rises steeply on the east side and the climate is fairly mild, with usually only 2-3 days of snow each winter (see photograph opposite).

On the south side of a ruin three areas of the fern are well established, measuring 30-100cm across. A sprinkling of young plants cling in the cracks of the wall which is made mainly of elvan stone, crumbling mortar and a little brick. The sunlight filters through in the afternoon, but on the west side of the building where the wood is thickest it is very shaded and damp all summer, and under the heavily overhung berried shrubbery more ferns can be seen, the crowns 15-25cm across, growing about 60cm high in the wall. Close by, rusting tram lines from old mine workings, obscured by brambles and ivy, denote an age long past. For 50 years this area was almost untrodden by human foot, as tin and copper mining ceased in the 1930's. A holiday chalet stands nearby and the ferns have twice been in danger from a down's fire and a nearby bonfire, but as the woods are private, there is very little disturbance. Attention is not drawn to its existence for fear of 'collectors'.

The ruined building, believed to be a very early smelting house, fell into disuse in the 1800's, but how long *Pteris cretica* has been there is not known. Mining has been going on for centuries, Phoenician ingots have been found downstream near Pentewan. Questioning village elders, one says that there are some plants of the same fern growing a mile downstream near the river, another says she remembers them growing here when she was a girl and that pot plants were not plentiful at the turn of the century in the village, some people had aspidestra or geraniums.

Pteris cretica established on a wall in Cornwall.

Polypodium virginianum 'Bipinnatifidum' (see p. 82)
(Photo courtesy of Ann Arbor, Michigan, USA)

Figure 1. *Microsorium punctatum* 'Craig's Monstrosum'. Mature plant. The ruler is 90cm (3 feet) long.

Figure 2. *Microsorium punctatum* 'Craig's Monstrosum'. Juvenile plant. The ruler is 30cm (12inches) long.

A NEW VARIETY OF MICROSORIUM PUNCTATUM (L.) COPEL

RALPH H. HUGHES, 1546 Del Rio Drive, Fort Myers, Florida 33901, USA

A strikingly new, distinctive and attractive polypod form from the Philippines added diversity to our large collection of staghorn ferns when imported into the humid, semi-tropical climate of southwest Florida about five years ago. Jack E. Craig, plant collector-explorer of the far east, labelled the variant 'Monstrosum' to distinguish one leaf form from another on arrival in this country. While some ferns are known to be highly variable, as noted by Richard Rush in the 1983 *Bulletin,* it turns out that one highly developed variant proved through spore-grown progeny to be distinct. It is described in cultivation as follows:

> *Microsorium punctatum* 'Craig's Monstrosum'. A large form with numerous narrow lateral lobes. Fronds up to 75cm long and 12cm broad, including the lobes. Lobes up to 30 on each side, 2.5 to 10cm long, 0.6 to 2.5cm broad at base; the larger ones caudate-acuminate and ascending, somewhat irregular. Sinuses between lobes narrowly rounded at base. Venation typical except that each lobe is entered by a main lateral vein reaching virtually to the apex. Fronds and lobes not forked. (See photograph opposite).

Earlier Copeland (1960) working in the Philippines, referred to the species as *Microsorium longissimum*(J. Smith)Fee, a synonym of *Polypodium microsorium.* He noted that the leaves of the type were very variable in length, width and details of venation. He alluded to the specimen as 'a monstrosity, with long segments excurrent from the sides', hence the name 'Monstrosum'.

The spore grown offspring were conspicuously different in leaf size, changes in margins, and overall size of plant, hence, as outlined by Hoshizaki (1975), obtaining plants with qualities of the parent requires culling to remove undesirable forms. Conversely, it is too early to speculate on any likelihood of finding a superior offspring. All individuals were, however, identifiable with the parent.

Growing sporelings was relatively easy when compared with those of the genus *Platycerium* growing side by side in the same garden. Even so, both survival and growth were twice as great for other polypods from the Philippines propagated similarly. This does not come as too much of a surprise, because Craig had reported that under shade-house conditions the other polypods volunteered profusely, whereas the somewhat less robust 'Monstrosum' self-propagated only sparingly.

When grown on treefern slabs or in medium-to-large pots or baskets and displayed in elevated or hanging containers to show off their long, wide-arching fronds, the short creeping rhizomes branch sufficiently to form an attractive large cluster. Plants are terrestrial in that when cultivated in pots with a loose soil mix, it is not necessary to provide moss-lined baskets for downward growth. No insect or disease problems were encountered in southwest Florida when grown beneath shadecloth varying from 30 to 80% density. Adult plants with high humidity withstood occasional cold snaps to 32°F (0°C). Losses occurred at 28°F (-2°C) of 3-4 hours duration.

Acknowledgements
My thanks are extended to Jack E. Craig for live plants, to Barbara Joe Hoshizaki and Michael G. Price for identification, to Phyllis Bates for preparation of the manuscript, and to my wife, Elizabeth, for raising the sporelings.

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NEW AND REDISCOVERED POLYPODIUM VARIETIES — WILD AND CULTIVATED

MARTIN RICKARD, The Old Rectory, Leinthall Starkes, Ludlow, Shrops SY8 2HP

As Jimmy Dyce and I were discussing all the new varieties discovered over the last few years it became clear that the number of finds was much larger than usual. Therefore we agreed to split the material into two — I would review new developments among the Polypods, while Jimmy would do everything else (thank goodness!).

The number of Polypodium varieties, new or rediscovered since 1981 is quite remarkable, not least for the fact that most are of North American origin. The best recent wild find known to me is undoubtedly *Polypodium virginianum* 'Bipinnatifidum' found on a field course led by Herb Wagner at Mount Lake Biological Station in Pulaski Co., Virginia, USA in July 1982. This is a very fine variety closely resembling the 'Pulcherrimum' forms of *Polypodium australe* (see photo opp. p. 80). It may however be truly plumose, but I don't know if the plant is soriferous. Apparently there were three small patches growing on a rocky slope separated by about 5 feet and growing with normal *P. virginianum.* A small piece of rhizome has been taken into cultivation at the University of Michigan, but as far as I know it is not in cultivation in Europe.

Other wild finds pale into insignificance compared with this North American success, however I have found quite a good *P. australe* 'Semilacerum' in Cheddar Gorge. In cultivation this has developed into a fine plant, strongly bipinnatifid. Another of my own finds was an extraordinary spiny form of *P. australe.* I found this while following up a specimen of *P. australe* 'Cristatum' from the herbarium at the National Museum of Wales at Cardiff. This was recorded as growing on limestone cliffs near Hanffre Gardens, Cwlach, on the Great Orme overlooking Llandudno. In the spring of 1984 I looked around the general area without success, before, with permission, exploring a back garden with a cliff absolutely swamped by *P. australe.* I found no 'Cristatum' but I was highly delighted with this spiny form, it may be a monstrosity, but it is different! It is depauperate, all pinnae are reduced in length, with the midrib protruding about 3mm beyond the tip of the pinna into a small spine (these have not come out very well in the illustration), hence *P. australe* 'Corniculatum' (see Fig. 2(a)). Similar types of variation have been found in Polypodiums in the past, e.g. *P. australe* 'Semilacerum truncatum' found by Barnes at Levens in 1863 — this too was horned. Other ferns also exhibit this type of variation, e.g. *Asplenium scolopendrium* 'Cornutum'. I await with interest the results of my spore sowings.

Of horticultural origin we have three new hardy North American forms to report — what other treasures must still be lurking unrecognised over there?! Ray Coughlin has raised in the U.K. at Birmingham, a 'Bifidum' from *Polypodium glycyrrhiza* agg. 'Caudatum' (I use the term *P. glycyrrhiza* **agg** because there are two or three rather similar wild species occuring in the Pacific North West of America. At this time I don't know which of these species has given rise to each of these varieties, although *P. glycyrrhiza* itself is favourite). This form is not strongly crested (see Fig. 1(c)), but it could well be the parent of something good. During its development this plant has changed its character somewhat, it was mentioned in my 1981 survey of British Polypodiums as number 46 (*BPS Bulletin,* 2(3)140). The other two forms have come via Judith Jones from Seattle. They are not new to horticulture, but they are possibly new to the U.K. The origins of both are obscure but I believe that the recent history of both is that they came from Neil Hall's garden, also in Seattle. The *P. glycyrrhiza* agg 'Grandiceps' is the most heavily crested form of any hardy polypod known to me (see Fig.1(a)). Neil and Judith are both to be congratulated for allowing such a fine plant to be released into wider cultivation. The other form courtesy of Neil and Judith is sterile *P. glycyrrhiza* 'Malahatense' (see Fig. 1(b)) — the sporing form of this variety was illustrated by Jimmy Dyce in *BPS Bulletin,* 2(3)128. This sterile form is

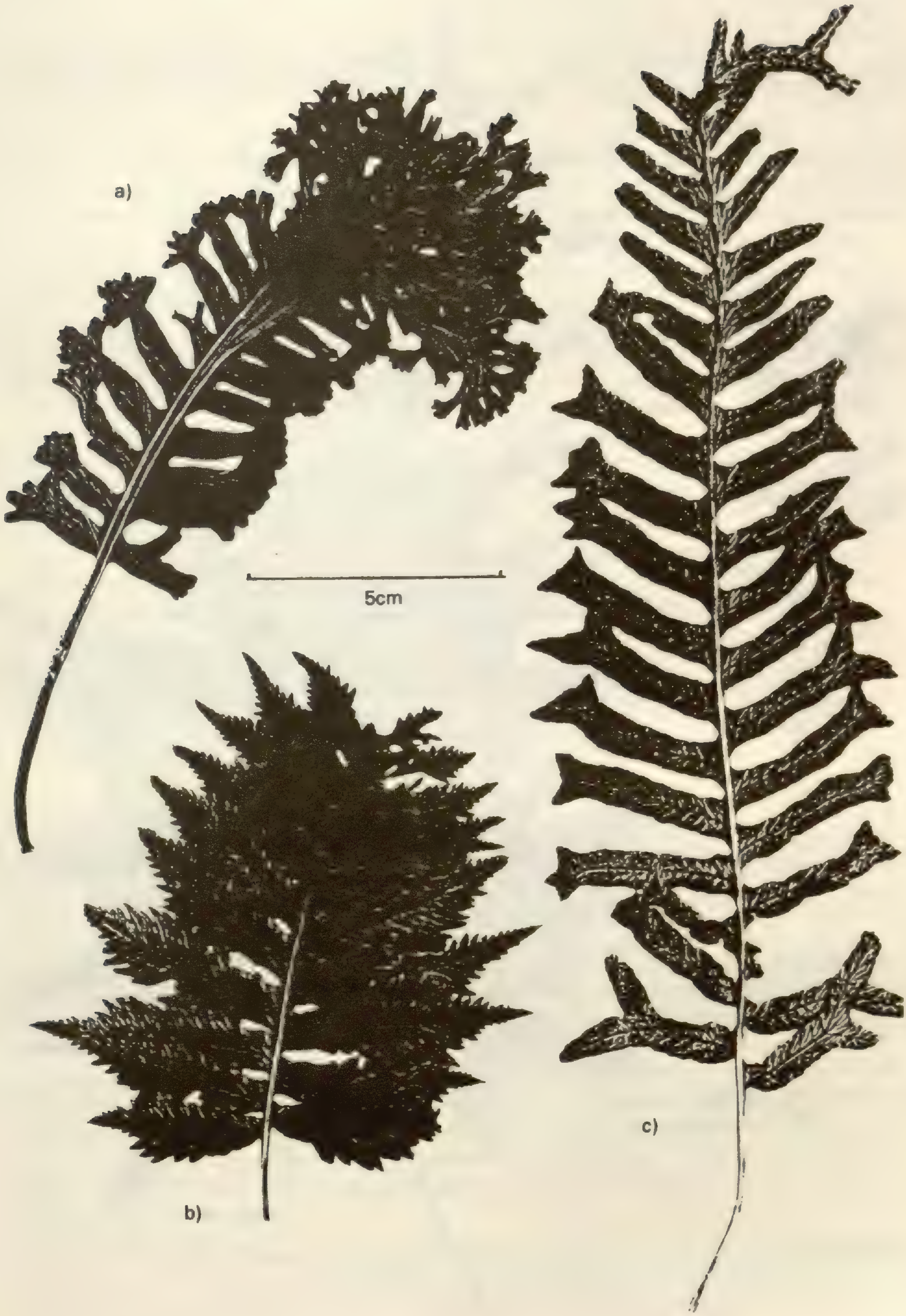

Fig. 1 a) *Polypodium glycyrrhiza* agg. 'Grandiceps'
b) *P. glycyrrhiza* agg 'Malahatense' — sterile form
c) *P. glycyrrhiza* agg 'Bifidum'

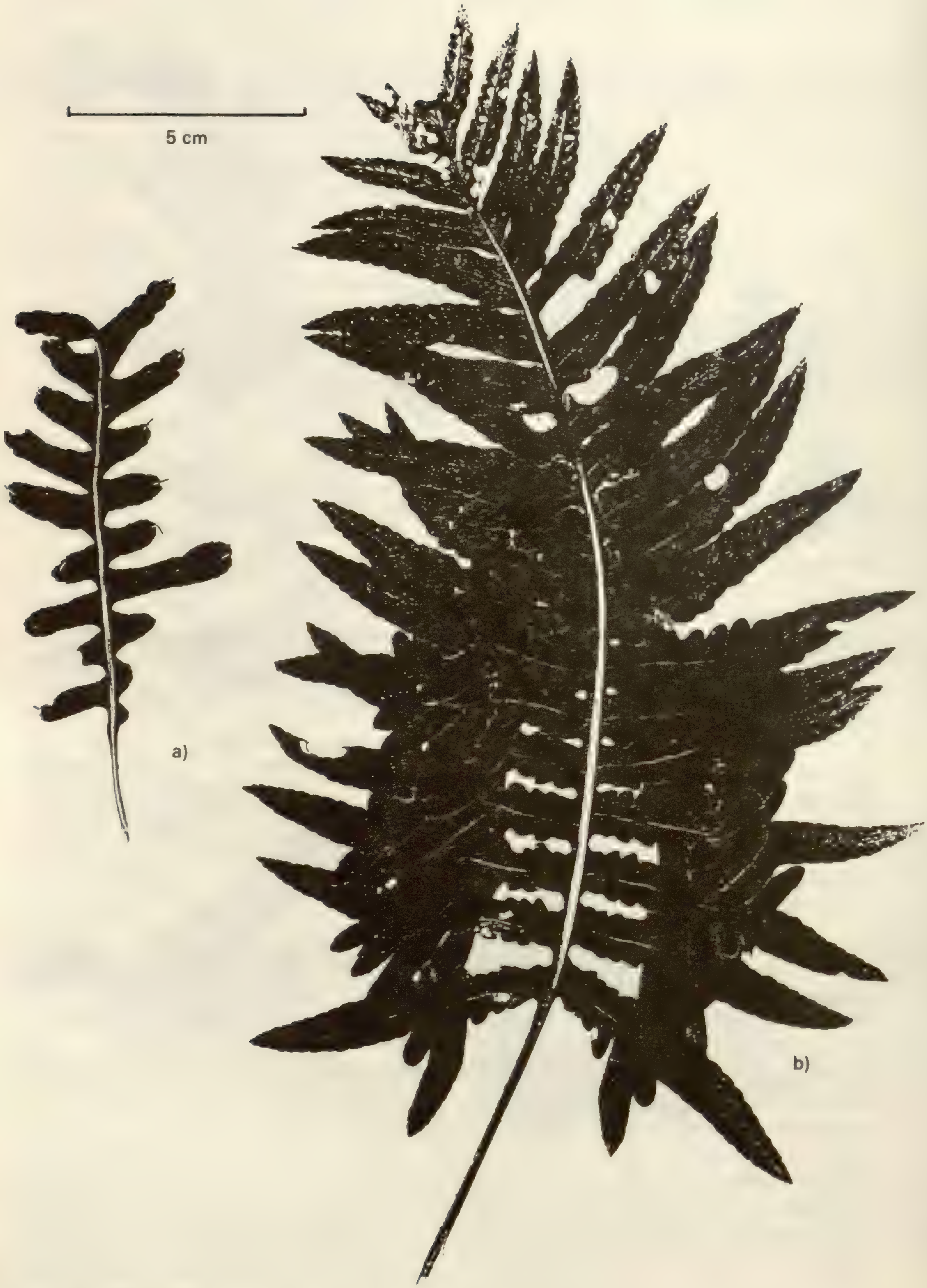

Fig. 2 a) *Polypodium australe* 'Corniculatum' b) *P. australe* 'Semilacerum Jubilee'

very fine with a texture similar to British plumose Polypods, it is however distinct from those that I know. I am not 100% sure that this is not a bud sport from *P. glycyrrhiza* agg 'Malahatense' (fertile) or vice versa. A similar form, probably the same, is also grown at Edinburgh Botanic Gardens. From the above it is probably clear that the nomenclature of these variations needs sorting out.

Another variety to turn up in cultivation is *P. australe* 'Semilacerum Jubilee' (see Fig. 2(b)). This is a very old variety found by Col. A S H Lowe near Athlone in Ireland in 1856 (see *Our Native Ferns* and *British Ferns* by E J Lowe). Of course there must always be an element of doubt when putting an old name like this to a plant still in cultivation, but a frond from the living plant and a pressed frond in the Cranfield herbarium at the British Museum (Natural History) resemble each other as closely as any two fronds do on the same plant! The plant we still have does fortunately have some sort of 'pedigree'. It came from Hull University Botanical Gardens about four years ago. Mrs Marston, long time curator of the gardens and currently proprietrix of a fern nursery nearby, remembers that hardy fern varieties at Hull were bought by Dr Cromwell before World War II, probably from Askew (who listed an Irish 'Semilacerum' in his catalogues at the turn of the century). This plant has therefore been in cultivation 50 or more years and links us back to Cranfield's time (died 1948). This variety is offered in Mrs Marston's current catalogue. At the time of my 1981 survey 'Semilacerum Jubilee' was listed erroneously and anonymously as an 'Omnilacerum' — number 18.

Footnote: All the fronds illustrated in this article were extricated with difficulty from under about 10 cm of frozen snow. They are all however representative of the varieties although *P. glycyrrhiza'* agg 'Malahatense', sterile form, is uncharacteristically small.

BOOK REVIEW

ATLAS OF THE DEVON FLORA-FLOWERING PLANTS AND FERNS by R.B. Ivimey-Cook. The Devonshire Association for the Advancement of Science, Literature and Art, Exeter, 1984. 258pp., 215 × 280mm. ISBN 0-85214-047-9. Price: c. £9.50.

The County of Devon (which includes Lundy Island) is a clement oceanic part of Britain and should, with its 90 inches of rain on Dartmoor, and 70 inches on Exmoor, be good for ferns. It is; forty-nine species have been recorded but at least three *(Diphasiastrum alpinum, Gymnocarpium dryopteris* and *Pilularia globulifera)* have not been seen for some time. *Ophioglossum azoricum,* a plant of dune slacks and maritime cliff turf, is found only on Lundy, where it is locally abundant (A. Cleave, *pers. comm.;* spec. in *BM*), contrary to the remark in this *Flora* that "it has not been seen recently". Surprisingly *Cystopteris* is rare, as is *Isoetes lacustris* (whereas *I. echinospora* is abundant in reservoirs) and the Marsh Fern. More *Asplenium septentrionale* may well be found if searched for along the eastern edge of Dartmoor.

This book, containing easily read computer-produced maps for all species which have been recorded in more than 10 tetrads (2 × 2km squares), often graphically illustrates plant distribution in relation to geology and topography. It is very reasonably priced and can be obtained from the publishers at 7, The Close, Exeter, EX1 1EZ.

A. C. JERMY

FERNS AND COMPANY

GWLADYS TONGE, 32 Horn Street, Winslow, Bucks, MK18 3AW

However remarkable a fern collection, and however awe-inspiring the degree of expertise and specialization it betokens, there is a great deal of aesthetic pleasure to be gained from grouping bulbs and flowering plants with the ferns. A group of ferns with differing frond outlines, segmentation and texture is very beautiful, but the beauty can be increased and illuminated by the addition of flowering or fruiting plants.

Never having possessed the courage or will-power to specialise, I find myself trying to accommodate a wide range of genera other than pteridophytes in a very limited area. These represent failed attempts at specialization where my enthusiasm, though it still persists, was insufficient to raise me to the level of connoisseur. As the garden is extremely small the task of providing not only the optimum environment, but also the right setting for so many plants is a stimulating exercise in forming good plant associations.

Favourite among my fern complements is ivy. Although my collection is by no means comprehensive, containing only five of the hotly debated number of species, the hundred or so cultivars, mostly of *Hedera helix*, which I grow, combine to give a wonderful choice of leaf shape, variegation, size and texture. *H. helix* 'Manda's crested' and 'Ivalace' make effective evergreen edgings to paths, while *H. helix* 'Shamrock', 'Pointer', 'Adam', 'Glacier', 'Goldstern' and 'Neilsonii' hang over the low retaining walls of the beds surrounding the pond. These beds are filled with ferns, and the resulting picture's impact is doubled and highlighted by a succession of flowers during spring and summer. These include *Commelina coelistis, Dicentra eximia, D. spectabilis* 'Aurea', *Orchis maculata,* and *Paradisea liliastrum* and various small astilbes. Best of all is *Lilium martagon,* both pink and white forms.

In another bed *Lilium regale* is well displayed among *Polystichum setiferum* 'Plumoso-divisilobum', *Polypodium sp.* 'Cornubiense' and varieties of *Asplenium scolopendrium.* Earlier in the season *Fritillaria imperialis* and *Helleborus orientalis* companioned the ferns.

Tricyrtis is a most useful member of the Liliaceae which blooms right through autumn forming fully perennial clumps of curious spotted flowers of a beauty and elegance well-suited to the fern bed. *Tricyrtis formosana* 'Stolonifera' and *T. latifolia* grow in an almost sunless corner of my garden, among *Dryopteris filix-mas* 'Linearis', *D. dilatata* 'Lepidota-cristata' and *Asplenium scolopendrium* 'Crispum'. This year I added a pure white hybrid *Tricyrtis* 'White towers' with velvety leaves which shows great promise. *Actaea alba* with red-stemmed white berries completes this group.

Sometimes an unplanned effect can be quite eye-catching as with *Trapaeolum speciosum* brought accidentally from my previous garden. It drapes itself over shrubs and clematis at the back of one bed with just the odd stem, studded with scarlet flowers, straying over the ferns at their feet. If it threatens to become over-boisterous it is easily weeded out.

Hostas are an obvious choice for combining with ferns, although their greedy inpenetrable roots, attractiveness to slugs and spaceless autumn demise to a sodden pulp are drawbacks where space is at such a premium. I therefore grow most of them in pots or tubs so that they can be a feature of container groups while at their beautiful best, and be removed to decent obscurity when that best is past.

Two shady window boxes are permanent home for small ferns and ivies, interplanted in spring with violas and polyanthus, and in summer with *Campanula isophylla* and dwarf fuchias.

In the beds in the small fernery I am trying some petiolarid primulas — *P. aureata, P. deuteronana* and *P. petiolaris,* as well as a few show and alpine auriculas and a couple of species from sub-section Erythrodrosum. The primulas having flowered in spring, will be shaded by the ferns (themselves shaded by a vine) in summer, and I am hoping to have more success with them in the beds than previously when grown in pots.

My six by eight feet, north-facing conservatory would be a complete aesthetic disaster did not the adiantums, pteris and nephrolepis bring cohesion to the motly throng of mini-addictions — small decorative-leaved begonias, dwarf, scented and fancy-leaved pelargoniums, primulas, fuchias and a large portion of my ivy collection, as well as various climbers, and, of course, more ferns. Instead of a conglomeration of potted plants there is a pleasing unified group but one which needs constant reorganisation as each flowering member has its day.

Perhaps, after all, it is more fun *not* being a specialist!

BOOK REVIEW

***BRITISH AND IRISH HERBARIA** compiled by D H KENT and D E ALLEN, Botanical Society of the British Isles, 1984. P iv, 333, 120 x 190 mm. Price £13. (This is a second edition of British Herbaria published in 1958).*

All known British and Irish herbaria are indexed in this valuable guide. Details of over 5300 collections at over 630 institutions are given in a concise easily understood format. The bulk of material inevitably concerns flowering plants, but there is still much of interest to pteridologists. The collections of many fern specialists are listed, e.g. Edward Newman, John Smith, Jimmy Dyce, Z J Edwards (all at British Museum (Natural History)); Thomas Moore (Kew); E J Lowe (Edinburgh); W H Standsfield (Liverpool); Frederick Clowes (Kendal) and many others. Sadly some big names are missing, e.g. C T Druery, J M Barnes and A J Macself, while at least one important collection, that of Dr Jones, has been lost. Systematic searching through surviving herbaria would surely reveal much interesting information. Indeed this book has filled me with the enthusiasm to inspect Lowe's and Stansfield's collections as a first priority — hopefully one day I'll get the opportunity! Of course non-specialist collections are also liable to be of considerable pteridological interest. For example I recently tracked down to Gloucester Museum a specimen of *Polypodium vulgare* agg 'Cambricum' gathered by Gustavas St Brody at Flaxley in Gloucestershire about 100 years ago. Unfortunately I have had less success in finding St Brody's wild colony of this fern!

This guide is the result of 35 years of work and the compilers are to be congratulated at bringing so much information together in a concise readily accessable form.

MARTIN RICKARD

THE FERN CRAZE IN THE SECOND CITY AND ENVIRONS

ALISON RUTHERFORD, Moniaive, 19 South King Street, Helensburgh, Dunbarton G84 PU7

Reading Martin Rickard's article *Fern Variety Hunting (Pteridologist,* 1, 44) I understand why the fern craze did not catch on in a big way in Scotland! The small areas of basic rock yield few varieties. Many suppose the mild West with its copious ferns made us too familiar to appreciate them, or that Scots seldom went in for crazes, so that ferneries under glass were not the 'necessity' they were in the South. However, delving into the neglected subject of West of Scotland 19th cent. villa and indoor gardening, has revealed conservatories, ferneries and cases, even plunderers and hawkers operating at the end of the century.

Hearing of English variety hunting, I recollected an Ayrshire widow's letter about her husband, Mr Laing going out with David Landsborough II (1826-1912), founder of the still-active Kilmarnock Glenfield Ramblers, and making good discoveries. Little was published on Scots finds, except in *Flora, Fauna & Geology of the Clyde Area* 1901. The editor said, 'There are several new and striking, and a considerable number of rare, varieties of *Nephrodium dilatatum* and of *Athyrium Filix-foemina* peculiar to it.' He went on, 'It is to be hoped that more attention will be devoted in future to these sections which have hitherto been comparatively neglected.' He thanked Laing, Landsborough and Mrs Combe, widow of the man credited with finding the Killarney fern in Arran 38 years earlier. He lists 46 varieties of Clyde area ferns.

The story of the eradication of the Corrie *Trichomanes speciosum* makes black reading. The Brodick — Corrie coast of eastern Arran is sheltered, mild with an equable climate, conglomerate and sandstone rock with fissures and percolating water. Despite its humidity, since the late 18th century it has been considered healthy for humans. In Cromla garden, Corrie, Landsborough planted *Eucalyptus,* palms, *Cordylines* and *Dicksonias* unprotected and *Trichomanes.* Disbelief in it being native, may have arisen from this plant which came from a Loch Fyne-side discovery of 1863. In August of the same year, a Mr Simson, an Edinburgh fern-collector holidaying in Corrie, 'scouring the country in quest of new additions,' was told to get in touch with Robert Douglas, the 'walking postman' who gathered ferns to sell to visitors. Simson, however, found him not knowledgeable, and having been misdirected and returning empty-handed, went to Douglas' back garden, where he saw moss-wrapped packets ready for sale. Instead of the desired Sea spleenwort, an unfamiliar fern caught his eye. Recollecting a fern book at home, he told Douglas it might be rare, but he would require to check. Later that day he set off for Campbeltown, met the postman again, gave him the good news and urged him to secrecy.

On his return Simson's family told of great excitement. The news of the *Trichomanes* had been in the Glasgow papers, for it was new to Scotland. Douglas was angry. The 'Glasgow gentlemen' had not given him credit, not did the papers! Simson asked to be shown the spot, and to their horror, the cave was found to be bare, perhaps rendered so by George Combe, always named as discoverer, and helped by Water Galt, who told Babbington of it. Both lived in Glasgow. Simson, groping on the cave's slimy floor, found a tiny rhizome which he planted under a bell-jar on his return home two months later, and which still flourished in 1886 when he read a paper to the Botanical Society of Edinburgh.

The second find was on the west side of the island in 1876, Robert Kidson wisely kept to himself the exact spot. The third was in the north, also by a holiday-maker. In August 1877 Miss MacBean of Paisley, walking over the moors, slipped her foot into a deep cleft. While lifting out a Hartstongue, she spied something else, and pulled up several feet of rhizome which she put in her basket. By the time the Curator of Paisley Museum was given it to name, it was so far gone that all his attempts at revival failed. Landsborough, in a paper to

the Botanical Society of Edinburgh, says he grew it uncovered at Cromla till 'trampled to pieces by workmen'. It has recently been refound in Arran, thankful to relate.

By 1875 plundering and hawking of ferns from the Firth of Clyde was quite brisk. Landsborough, in his book on Arran (1875) deplored the use of ladders to reach inaccessible places and begged locals not to lend them. He said Arran's Royal ferns were once common with 12 foot (3.66m) fronds, but now were sadly diminished. Probably interest was initially stimulated by James Bryce's *Geology of Clydesdale and Arran* (1859). By the 4th edition (1872), he had over 4 pages on ferns with localities, and Landsborough had copious notes in his book of three years later. This would coincide with the vastly improved steamer and rail service, the spread of Glasgow and the rapid increase of suburban villas, some of whose gardens were small and overshadowed, according to Sweet, just the place for ferns! Professor Balfour taking his students to Loch Lomond reported *Osmunda regalis* as common in the 1850's, but it is rare there today.

In 1880 Alexander Fleming, a retired head gardener, published his *Botanical Guide to the wild flowers in the West of Scotland,* about a third of which was on pure horticulture. He raised ferns to enormous size, winning a prize for a Welsh polypody 12 inches (38 cm) across, in sphagnum compost. He grew the proliferous Softshield Fern, which features in a family photo of John Logie 'Television' Baird in 1888, and is still seen today about Helensburgh. In 1889 Alexander Sweet's *Villa and Cottage Gardening, Specially adapted for Scotland* came out, with more than a hint of fern-interest. There were instructions for ferns in north windows, in pots in the open and in laying out of ferneries. 'Ferns', he said, 'have become a perfect craze with many people, and all too often leads its votaries to neglect the culture of other plants;' on *Osmunda,* he remarked, 'To buy it from street hawkers is to assist in its continued destruction in the remaining corners where it has its last retreats.' And about the Hartstongue, 'visitors at the coast and Isle of Arran think lightly of carrying it away in dozens, until it is scarcely to be found now, even there.' He had little to say on greenhouses, conservatories or Wardian cases, though he grew *Trichomanes* 'under a glass', where it did 'very well indeed'. Window cases must have been quite common however, as Andrew Meikle (c 1876) said, 'In the western parts of Scotland they have been in use for several years,' and went on to describe one he saw in Edinburgh about 20 years earlier. By this time, prosperous businessmen of the 'Second City' were building mansions in the country; the pollution was so bad, men's hats were turning green! Elegant conservatories were attached. Many of these are still in use with their curved roofs, domes or crenellated ridges. A superb example of glass architecture is the Kibble Palace. John Kibble, a remarkable inventor, designed it for his house and later gave it to Glasgow Corporation with enlargements. It could seat 4,000 and was used for meetings and concerts. Today it is in the city's Botanic Gardens. John Hix's researches (1974) uncovered the Glasgow firm of Walter MacFarlane who by 1870 were offering kit conservatories. By 1880 they exported to India, Egypt and South Africa; their illustrated mail order catalogues showed cast iron and glass used for arcades, conservatories, aquaria and pavilions.

Perhaps the finest Wardian case extant, is also in Glasgow, at the People's Palace Museum. It has been featured in many recent articles and books to the point of over-exposure, since the revival of interest in Victorian indoor plants. My own, more of a cottage-villa in style (see *Bulletin* Vol 1 No 2) came from Argyll, and from information gleaned so far, from the area where one of Britain's first wild gardens was made, Sir John and Lady Ord's Kilmory Castle, Lochgilphead, in the early 1850's. The garden has many ferns, bog and alpine plants (CM, 1855). I have not looked there for crested or tassled ferns. In Dunbartonshire only two varieties of *Polystichum setiferum* and one *Dryopteris affinis* 'The King' and four of Lady fern have been recorded!

The *Helensburgh Directories* between 1876 and the Great War, reveal a tiny burst of local fern-fever. In 1899-1900, James Lindsay 'Glazier and Glass Merchant', besides offering

window cleaning and painting, sold 'Glass and fern shades', and had 'Globes and Co. in stock'. By 1901-2 his premises, now an accountant's office, had become a 'Depot for Glass Shades (round, oval or square) of Every Description', and 'propagating glasses and frames, fern shades, stands and cases'. Window work was abandoned. By 1903-4 he had a telephone, and was still trading in 1906. By 1912-13 he offered only the shades of 'every description', and wreaths and crosses (he had begun with funeral flowers). The fern venture must have begun to fail, for by 1915-16, he had moved. He advertised, 'windows cleaned, painted and repaired', and the same for greenhouses. After this no more is heard of him. None of the other nurserymen or florists offered cases, domes or even ferns. Though Helensburgh considered itself fashionable and second only to Glasgow, it seems to have been rather 'slow', and by the end of the Great War, ferns and much else would have sunk into obscurity.

I have not had time to visit the Local Room of the Mitchell Library in Glasgow nor the local collection in Paisley, a strongly horticultural place since the 18th century. Only by searching through town Directories will the extent of fern cultivation in the area be known. Few gardening magazines for the Scots lasted any time. Ferns may have softened the palms and aspidistras or thrived in the shade of spotted laurels and conifers or survived the Robinsonesque gardening on larger estates at the end of the period — it is at present an unexplored avenue.

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CHROMOSOME NUMBERS IN VARIETIES OF POLYPODIUM

MARY GIBBY, Dept of Botany, British Museum (Natural History), Cromwell Road, London SW7 5BD

The Welsh Polypody, *Polypodium australe* 'Cambricum' was first recorded by Ray (1690) on a rock in a wood near Dennys Powis Castle'. Since that time it has become widespread in cultivation, and, although it has been recorded from other localities in Wales, Martin Rickard has suggested that most of these records are of garden origin. Shivas (1961) reported that 'Cambricum' is a diploid (2n = 74), although she did not have access to material from the type locality as it was believed to have become exinct there. However a small population was recently discovered on a cliff face near Dinas Powis (see Harrison, 1980), and I was able to obtain a small offset for cytological examination. This material is diploid with approximately 74 chromosomes in root tip mitosis. Martin Rickard has supplied me with two other morphologicaly distinct plumose *Polypodium* varieties, 'Barrowi' and 'Hadwinii', and for these I have also obtained diploid counts in root tip mitosis, thus confirming that they are varieties of *P. australe*.

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CETERACH OFFICINARUM IN STAFFORDSHIRE

M L CASTELLAN, The Lane Cottage, Wootton, Ellastone, Nr Ashbourne, Derbyshire;
M BAINES and M M KINGSTON

The first plant of *Ceterach officinarum* I ever found was behind a leaking drainpipe high on the outside wall of a 'Gents' near the ferry across Milford Haven in Pembroke Dock — it was quite a thrill — I had been on the lookout for it for years. A few days later I found another, this time beautiful, colony along a wall by the sea at Dale. Over the years there followed other good colonies, e.g. in a car park at Brecon and later during the Society's meetings on various churchyard walls etc. — anywhere but in Staffordshire!

The *Flora of Staffordshire* by Edees (1972) gives records from 1844 to 1955 and more recently there has been a small colony on a rock at Wetton Mill in the Manifold Valley. This is our nearest limestone dale and the limestone comes south from there to end in the Weaver Hills (summit 1217 feet), with a skirt of triassic sandstone and marl dropping down to the Dove Valley. Wootton hamlet, built on and off the sandstone, is on the spring line at about 650 feet.

Not so long after moving here, Win Baines and Margaret Kingston went for a walk up Weaver (while I cooked a meal) and they arrived back to say they had found *Ceterach* in an old limestone gravel quarry at 900 feet (GR SK 101459). Later we found a much larger colony in a nearby small limestone quarry — Raddle Pits at 950 feet (GR SK 108461).

It can be interesting at times to speculate on where isolated colonies of plants come from. Across the River Dove four miles into Derbyshire to the south-east are Snelston old copper mines (disused) and Birchwood Park Stone Quarry (GR SK 154413) with a fairly recent record for *Ceterach*. Living in the area we think it possible that the spores could

have come on a wind frequent here, and rise by thermals over the acid sandstone up to the limestone to come to rest in crevices damp enough for germination. This would account for the rather high altitude of the colonies. Weaver Hill rising behind to 1217 feet gives some shelter from cold winds — and for us an uninterrupted view into six counties.

BOOK REVIEW

FERNS OF JAMAICA by George R. Proctor. British Museum (Natural History), 1985. P viii, 135 figs., 175 × 253mm. Price £50.

This substantial volume is the first fern flora of Jamaica since the same author's *Preliminary Checklist* published in 1953. The present work is however, in a different class, being a very full fern *flora* of this fern-rich island.

With almost all the book, 585 pages, given over to the systematic section, few introductory details are given. This is in part because no historical account of Jamaican botany has yet been prepared, but other details, like a decent map of the island, can apparently be easily found elsewhere, e.g. in the 1953 checklist. Certainly I found the pull-out geological map published in the 1953 edition most useful, and I regret its exclusion from this otherwise far superior work. 579 species and 30 clearly defined varieties are described here (as opposed to 524 in 1953), of these the vast majority are species restricted to tropical Central America, with 82 being endemic to Jamaica. Only 5 species are of cosmopolitan distribution, including some familiar European species, e.g. *Cystopteris fragilis, Lycopodium clavatum, Adiantum capillus-veneris* and *Hymenophyllum tunbrigense* – although I wonder if some of these are really the same taxa we have in Europe.

It is perhaps difficult for the European pteridologist to grasp that 609 fern taxa (excluding hybrids) grow on this island only 148 miles long. The richness of the flora is phenomenal, for example in the Hymenophyllaceae 49 species have been recorded. (While I prefer to leave comments on nomenclature to professional botanists, I must say I am pleased to see that all these species are placed either in *Hymenophyllum* or *Trichomanes* – although each species is also grouped into less familiar subgenera).

Throughout the book each taxon is described to a standard format, this includes a full description, details of distribution (in and outside Jamaica), together with an outline of the preferred habitat. Black and white illustrations are given of species representative of each genera. These illustrations are of a high quality, being a mixture of reproductions of 19th or early 20th century prints, and specially commissioned modern drawings. Distribution maps are given for a few species, and there is a list of all known fern collectors, together with a glossary and bibliography.

To me the initial impact of this book was very favourable and longer acquaintance with it does nothing to change this view. This is a book of rare quality. The author is to be congratulated on covering such a large subject so thoroughly and so clearly.

MARTIN RICKARD

HARDY FERNS — FEEDBACK

RICHARD RUSH, 17 Toronto Road, Ilford, Essex

Even before my *Guide to Hardy Ferns* appeared I knew of, and sometimes had plants of, various unlisted species which deserved inclusion but which, for practical reasons, couldn't be added: I couldn't go on endlessly adding to or revising my selection of species. Although I have no immediate plans to work on a second edition, or sequel, I have a cardboard box serving as a data storage and retrieval system into which I've been placing useful letters and so on. Now that the Guide is in print, I'm hopeful that I'll receive more contributions (as I've implied I've already had a few letters of the hoped-for kind, supplying valuable information).

I can't guarantee at this stage that there will be a second edition, but I would aim not to waste useful information supplied by keeping it secret.

I hope you'll tell me of species which I should consider adding (please supply as much information as you can); of errors in the *Guide;* of the horticultural requirements/preferences of species/genera which are or should be included in the *Guide,* including 'negative' information such as that a species/genus is difficult to raise and/or grow; of synonyms which I should add as cross-references because a fern grower could encounter them in modern literature or in *important* broadly popular older works; of any further cultivated varieties of non-British hardy to semi-hardy species; of scientific papers or articles in horticultural journals (especially non-British) which you think could be instructive to me — and so on. The *Guide* was largely built out of small pieces joined together, but, unlike a jigsaw, if there are important details missing, their absence may not be obvious unless they are pointed out. E.g. if I failed to say that a species is confined to acid soils, it's likely that I didn't know — and I'd be obliged if you pointed this out.

If there should be a second edition of the *Guide* I'd like to absorb into it the information in 'Raising Pteridophytes from Spores: the Special Cases' which I compiled for the 1984 *Pteridologist:* what have you to add to that?

Finally I ought to confess now that I've had a protracted bout of epistolarian lethargy, and prompt replies to your notes aren't promised.

BOOK REVIEW

FERNS TO KNOW AND GROW by F. Gordon Foster, Timber Press, Portland, Oregon, 1984. 228pp. 28 black and white photographs, numerous line drawings, 8½" × 11", $29.95.

Mr. Gordon Foster's *The Gardener's Fern Book,* published in 1964, at $7.95 (62 shillings in U.K.), was described as admirable by Reginald Kaye in his review in Brit. Fern Gaz.: 9(6) 1965. A revised and enlarged edition was published in 1971, as *Ferns to Know and Grow.* It had 32 more pages and J.A. Crabbe reviewed it favourably. The book now under review is described as a new and enlarged edition, and is in a larger format. The price, too, is now on a grander scale.

The first 62 pages give a general introduction to ferns and to their cultivation, outdoors and indoors. The author, probably unconsciously, seems to be writing superficially for readers in the Northeastern USA who have large suburban gardens and/or still more spacious rural retreats. Nothing is said on greenhouse cultivation.

The photographs are grey and lack contrast and sharpness. 130 pages are devoted to 132 taxa, mainly species, generally allotted a page apiece, with drawings and descriptions and cultivation notes. Since many entries don't fill their pages, even with a somewhat stretched-out layout, there is no obvious reason why, in many cases, distribution outside N. America is ignored or incomplete (the entry for *Adiantum pedatum* omits both Asian *and* N-W N. American distribution, as well as saying nothing about subspecies/varieties etc.), and why, throughout, authors of scientific names, and synonyms and synonym cross-references are omitted.

The drawings, by the author, are generally serviceable, albeit amateurish and sometimes heavy-handed. The accompanying silhouettes of fronds, which look as though mechanically produced, are useful. It isn't easy to understand why, with only 132 main entries, and since the book wouldn't be of much value as a field guide, ferns are included which are inconspicuous and/or are, in the author's own judgement, difficult or almost impossible to grow or otherwise unsuitable for cultivation: about 28 could be so classed. Why give a page to the unspectactular, probably tender, dwarf *Asplenium pumilum,* which is "not recommended for horticultural use", when leaving out (e.g.) *A. ceterach, A. flabellifolium, A. aethiopicum?* Why give a page to *Acrostichum aureum* and *A. danaeifolium* if "because of their coarse and unattractive leaves and excessive size, these species are not recommended for horticultural application", and pages to rampant weedy ferns like Bracken and Marsh fern, when, meanwhile, you mention very few *Adiantum* spp., no *Doodia* spp., only two *Blechnum* spp., and so on? Why ten pages dealing, in no great detail (and much blank paper), with *Botrychium* and *Ophioglossum* — just ten of them — when only three *Cheilanthes* spp. are included? Coverage of hardy fern varieties is minimal (and odd: the two Hart's-tongue variants mentioned won't be easily obtained) but presumably this isn't from disdain, for while *Polystichum setiferum* and its variants aren't mentioned at all there are two pages on *Nephrolepis exaltata* cultivars. Coverage of non-American hardy ferns is poor, as is, bearing in mind the enviably wide range obtainable from American nurseries, coverage of semi-tender to tender ferns.

The Japanese Painted Fern is named as *Athyrium niponicum* when var. *pictum* of that species is meant. *Dryopteris filix-mas* cv. 'Cristata' (sic) is *not* "known as the King of the Male Ferns" and what does the author mean in saying that it "strongly resembles our exceedingly rare *Dryopteris filix-mas?*" It would, wouldn't it?, in that it's the same species; and it doesn't, does it, inasmuch as it's a well-marked variant? There aren't many revelations in the cultivation advice in entries. Readers are sometimes not told what they should know. E.g. in the entries for *Phyllitis scolopendrium* (a muddled treatment) and *Dryopteris filix-mas* — both rare in N. America — it isn't made plain how much easier to raise and grow European plants are.

There's a useful glossary and another five pages, headed "Fern Selector", reiterate previous content in lists telling us what ferns we should use where.

There is no bibliography, which may be significant. Disappointingly this new edition doesn't seem to have been much nourished by, or to notice, other works. It's respectable enough, and it's another one for the shelves of fern book collectors, but it doesn't have anything in it which other fern books don't do better.

RICHARD RUSH

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ADIANTUM PEDATUM: ANOTHER VARIATION

JUDITH JONES, 1911 Fourth Avenue West, Seattle, WA 98119, USA

Over the years of knowing and growing *Adiantum pedatum* var. *pedatum,* var. *aleuticum,* and subsp. *subpumilum,* I have become the sceptical owner of innumerable named forms. These assorted Maidenhairs reflect all the nuances of what might be considered to be within the normal range of variation. I've seen otherwise sane and experienced gardeners pick one of a small sowing of an *Adiantum pedatum* "form" and proclaim their new discovery from the rooftops. Introducing a surprised Jimmy Dyce to 'Dyce's Dwarf' on his 1980 trip to Seattle certainly increased my scepticism! The mystery surrounding another form once offered by a renowned local horticulturist was solved by a trip to retrieve our children from a summer visit. As we neared our destination in northern California we passed by open hillsides with stands of *A. pedatum.* Eureka! (not to be confused with the town of Eureka in California) here was the origin of *A. pedatum* 'Patrick Creek'! I still don't know if the original selection represented the population in general or one specimen in particular. The horticulturist who sold this form is a recluse in another country and I have not had an opportunity to question him about this selection, and several others, offered in his catalogue of many years ago.

The key to determining the validity or desirability of assigning a varietal name to any species depends a great deal on whether the change represents a whole population or one specimen in particular, and how that named form is propagated for distribution. In the majority of cases it appears that new variations occur as single specimens departing from the norm. The selection of successive generations can yield truly impressive results. Then the grower has to deal with the reliability of the chosen variant from spore. The rule of thumb seems to be that the more superior a variation is, the more unreliable it is from spore. In many cases it may even be sterile. So that leads to vegetative reproduction and the slow but certain increase of the original clone.

A small percentage of new variations occur in quantity from a single spore sowing. In order to recognise effectively a varietal "strain", a grower needs to have a wide experience with that particular species' normal range of variability in cultivation and in the wild. If you are fortunate enough to have access to an extensive range of native populations, and the facilities to grow thousands of sporlings on to maturity then you are in a good position to educate your eye to spot any departure from the normal range of variation.

A. pedatum is a highly variable species in all its recognised native populations, especially var. *pedatum* and, to some extent, var. *aleuticum,* var. *calderii,* and subsp. *subpumilum,* and, in fact, in high production controlled cold greenhouse cultivation some distinguishing traits of collected plants diminish and others are enhanced. When considering possible *A. pedatum* variations I like to remember Jesse Shaver's description:

> "The ultimate pinnules are very variable in shape. Those near the base of the pinnae may vary from flabellate to deltoid or reniform, those near the middle are mostly oblong or slightly triangular, and the terminal leaflets are flabellate; all are oblique ... Although there is considerable variation in Tennessee specimens of the American Maidenhair (indicated by sketches) no recognised forms have been found so far."

Now, don't let my sceptic treatise convince you I don't believe in the validity of some named *A. pedatum* cultivated selections. Richard Rush provides us with a very good beginning at taking a long look at some accepted named forms. It is interesting that, among the many named forms we acknowledge, these variations have to do with changes in the shape of the leafy parts, or pinnule shape, and their position on the stipe, from wide spacing to close proximity.

Adiantum pedatum 'Tasselatum'

I have done a lengthy research through every fern book and periodical I can lay my hands on to find a recorded example of a radical skeletal change for *A. pedatum*. It is, therefore, with great pride and excitement that my partner, Torben Barfod, and I announce the occurrence of a new strain of *A. pedatum* with crested apices on the pinnae. We have tentatively dubbed our strain *A. pedatum* 'Tassellatum'.

Barfod's Nursery propagates from six to ten thousand *A. pedatum* sporlings a year and in the process of potting on this past fall two crested Maidenhairs were discovered. After some friendly teasing about not letting me see these "unusual Maidenhairs" (just repayment for my pooh-poohing Torben's facetious selection of a *Polystichum setiferum*

he dubbed 'The Prince') I was escorted over to them. Torben suspected that these Maidenhairs were very different but he didn't fully realize how special they were until I began hopping all over the greenhouse in wild ectasy. All the frenzied exhilaration was not expended on just a mere two specimens for, as we studied the many flats (trays — Ed.) of sporlings, we kept discovering more crested plants. At the end of an hour we had, gathered together, between thirty and forty plants. As in any strain, some of the plants appeared superior to others. Part of this variability is due to the expected range of variation in a strain and to the various stages of maturity of the selected plants. An *A. pedatum* culture can be harvested over a one to three year period as the rate of development is extremely uneven.

Since we gather spore from the wild, the garden and the greenhouse, it is impossible to determine the exact percentage of this exciting development. We don't grow any of the tropical *Adiantum* varieties although we have had a couple of flats of *A. pedatum* from a tropical fern grower. However, this grower did not grow any of the possible *Adiantum* cultivars which might have influenced this cresting. We are anxiously awaiting the outcome of winter to determine the remote possibility of an *Adiantum* cross. A few spores were harvested and sown this winter and only time and observation will finally determine the status of *A. pedatum* 'Tassellatum'.

Upon receiving my excited letter and pressed fronds, Jimmy Dyce brought up the crucial question of whether to introduce *A. pedatum* 'Tassellatum' as a strain or as a single selection of the best plant. Jimmy's admonition was to "remember Druery's possible error in allowing *all* his *Polystichum setiferum* 'Plumosum Bevis' progeny, good, bad and indifferent, to be recognised as 'Drueryi' ". For the present, we will proceed with caution, and in time we hope to see *A. pedatum* 'Tassellatum' in wide circulation.

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SHORTER NOTE

Fern Finds in Lincolnshire

It is always a pleasure when old records for rare ferns are refound or new records turn up. Marsh Fern, *Thelypteris palustris*, was probably common in Lincolnshire before the fens were drained, but in recent years it has only been found at two sites, both railway ballast pits. At Crowle, it was last seen in 1981 and it apparently disappeared at Sleaford when a pool was deepened for angling.

At Sleaford there is a second shallow marshy pool, and *T. palustris* has recently been found there, the only currently known site in the county. It is a remarkable spot, right by the railway. The flora includes *Equisetum fluviatile, Juncus subnodulosus, Typha angustifolia* and *Dactylorhiza fuchsii*, and also there are grass snakes.

Mrs. I. Weston, the County Recorder, tells me of another new fern rarity. *Pilularia globulifera* is abundant in old sand pits at Messingham, a county Nature Reserve (Vice county 54). It has now also been found at a pond on the edge of Lincoln; this is a new record for Vice county 53.

DR N.J. HARDS

GENOME ANALYSIS AND POSSIBLE COMBINATIONS IN THE DRYOPTERIS FILIX-MAS GROUP

ANTHONY PIGOTT, 43 Molewood Road, Hertford, Herts. SG14 3AQ

During the BPS field meeting in Argyll, August 1985, there was much discussion about the various forms of the *Dryopteris affinis* complex and their corresponding genetic composition. Much of this discussion was in terms of genomes and the 'algebraic' shorthand used to describe them. The intention of this article is to explain the basic ideas behind genome analysis to those unfamiliar with it and to enumerate some of the different genome combinations in the *Dryopteris filix-mas* group (alternatively the *Dryopteris affinis/caucasica/oreades* group; i.e. the male ferns) that could theoretically exist by means of known mechanisms. Some of the combinations have previously been identified with known taxa as the result of conclusive or provisional experimental work. No attempt is made here to draw any further conclusions, but only to highlight the possibilities.

All living organisms have at least one set of chromosomes which contain all their necessary genetic information. Each complete set of chromosomes is known as a genome. The basic arrangement in pteridophytes is for the cells of the sporophyte (or 'adult' plant) to have two complete sets of chromosomes, i.e. two genomes. Such a plant is known as a diploid, and its genomes can be represented by the shorthand code 'XX'.

Genome analysis is the name given to the investigation of the genomes of species and hybrids, particularly comparative work. (The term 'species' is used in this article to mean an evolutionary species, i.e. a biological species or its apomictic counterpart: a population with a common and distinct genome composition). This is of great use in taxonomy and (at least micro-) evolutionary studies. Most genome analysis is based on the investigation of chromosome pairing behaviour, so it is necessary to briefly review the relevant processes applicable to this group. For an extensive and authoritative account see Lovis (1978).

Normally cell division is by a process known as mitosis, during which the chromosomes are duplicated, and two cells result, each with two sets identical to the two sets of the original cell. During spore development in the young sporangium, 16 'spore mother cells' are formed by mitosis. In each of these cells a different type of cell division, known as meiosis, subsequently takes place. In the first stage of meiosis, the two sets of chromosomes form pairs, each chromosome pairing with its opposite number from the other set. The chromosomes then separate, one chromosome from each pair moving to opposite ends of the cell, resulting in two complete sets of chromosomes divided randomly from the original two sets. These chromosomes subsequently duplicate and divide, giving four cells each with one complete set of chromosomes. The cells, 64 in each sporangia, develop into spores, then into the gametophyte (or prothallus) and eventually into sperm (-atozoids) and egg cells. Such cells, with a single set of chromosomes, are known as haploid, and their single genome can be represented by 'X'. After fertilisation of an egg cell by a sperm cell, the resulting embryo has one set of chromosomes from each of its parents, and the diploid state is restored. The embryo develops into the sporophyte with genomes represented by 'XX' and the cycle repeats itself. This sexual life-cycle is shown schematically in Figure 1.

A species with the sexual cycle as described above may have in the sporophyte not two sets of chromosomes but some higher multiple. Such sporophytes are known not as diploid but as tetraploid, hexaploid, octaploid and so on according to their number of genomes. Species with a number of genomes greater than the two of the basic diploid are known collectively as polyploids. Polyploid species may form from another species of lower ploidy level by a single defective occurrence of mitosis or meiosis in which the chromosomes are duplicated without the accompanying cell division. This may occur in

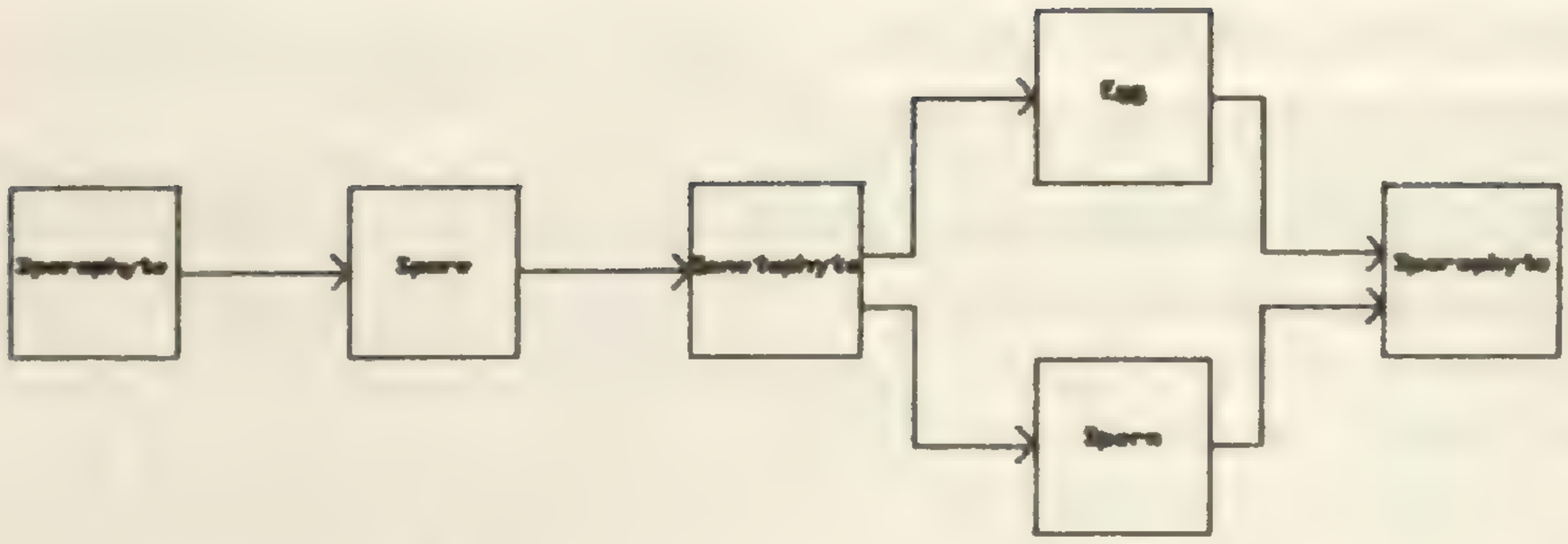

Figure 1 — Sexual Life-Cycle Schematic

an otherwise normal sexual cycle, resulting in spores, and hence gametophytes, with an unreduced chromosome number. The multiple genomes may behave as a diploid with normal chromosome pairing, and so allow a regular sexual cycle, which produces viable spores and allows fertility. When a polyploid species has been formed directly by the doubling of genomes in another species, it is known as an autopolyploid, and can be represented by 'XXXX', 'XXXXXX' etc. Autopolyploids can be fertile through diploid-type meiosis but multivalent formation (the joining of like chromosomes in groups of more than two) may prevent normal pairing and separation in meiosis and thus produce sterility.

If the sperm from one species fertilises the egg of another species, then a hybrid is formed. This can happen quite frequently in the case of closely related species such as those in the *Dryopteris filix-mas* group. If the genomes of the two parent species are 'XX' and 'YY', then the genomes of the hybrid are 'XY'. If the two parent species are sufficiently closely related, then the hybrid sporophyte may be fully viable. However, because of the presence of two different genomes, meiosis is likely to be defective due to failure of the chromosomes to pair and separate into balanced sets. Abortive spores will be formed and thus the hybrid will be sterile.

It is possible, on rare occasions, for a hybrid formed by the method just described to become fertile. A single occurrence of mitosis or meiosis failure doubles the chromosome number with the genomes 'XY' becoming 'XXYY'. Subsequently, the plant and its progeny continue normally, with the double genomes behaving as a single pair during meiosis, as described earlier. By this process of chance chromosome doubling, a hybrid may give rise to a fully fertile new species. Such a species, with multiple genomes from more than one parent species, is known as an allopolyploid. A hybrid between two sexual species, where one of them is a polyploid, can result in uneven numbers of genomes. For example, if the parent species are represented by the diploid 'WW' and the tetraploid 'XXYY', then the resulting hybrid is a triploid 'WXY'.

Some apomictic (non-sexually reproducing) species such as the *D. affinis* complex, have a somewhat different life-cycle. The last stage of mitosis before meiosis, which in the sexual case described earlier gives rise to the 16 spore mother cells, is defective and results in 8 spore mother cells each of which has four sets of chromosomes. The 8 cells subsequently divide by regular meiosis, with the doubled genomes allowing a diploid-type division as in the case of an allopolyploid, to give 32 diploid spores in each sporangium. Each spore develops in the usual way into a gametophyte which in this situation has the same number of chromosomes as the sporophyte from which it was formed. Therefore, if the sporophyte is diploid with its genomes represented by 'XX', then so is the gametophyte which is derived from it. The gametophyte which develops produces viable sperm cells but no egg cells, and so is incapable of forming an embryo from fertilization. The gametophyte produces a sporophyte directly from a vegetative bud. This sporophyte is diploid, develops into a mature plant and the apomictic cycle starts

again. This apomictic life-cycle is shown schematically in Figure 2. Although most of the sporangia develop with 8 spore mother cells, a small proportion may follow the same path as in a sexual species and have 16 spore mother cells. If there is an unbalanced genome combination, as in the *D. affinis* complex, then meiosis is likely to be irregular as in the case of a hybrid, and abortive spores will result. However, the pairing behaviour in the '16 cell sporangia' is of great interest for genome analysis.

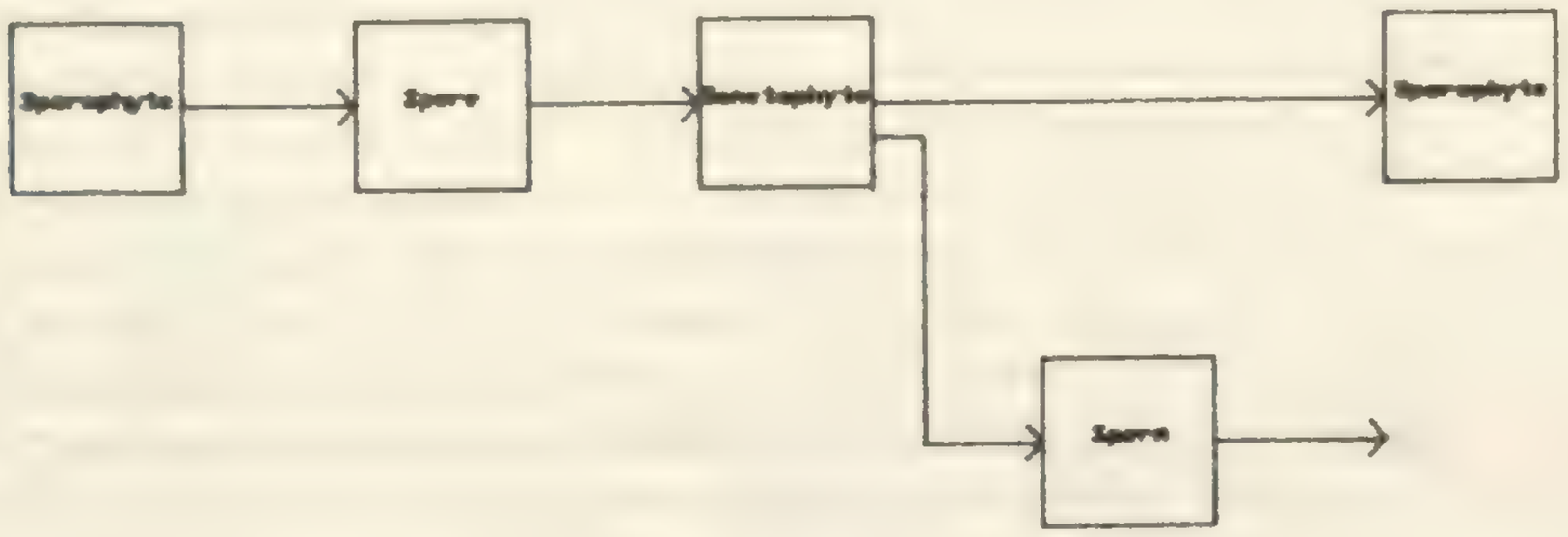

Figure 2 — Apomictic Life-Cycle Schematic

A hybrid formed between a sexual species and an apomictic species of the kind described earlier will generally have an unbalanced combination of genomes. For example, if the parent sexual species is a diploid represented by 'XX' and the parent apomictic species is a diploid 'ZZ', then the resulting hybrid will be a triploid 'XZZ'. The apomictic parent has made a 'double' contribution because of its unreduced chromosome number in the sperm cell. It is a characteristic of apomictic species of the *Dryopteris affinis* type that the apomictic behaviour is inherited by their hybrids with sexual species. The degree of inheritance may vary, probably being dependant upon the overall proportion of *D. affinis* in its genomes, and may be manifested in the relative numbers of '8-cell' as opposed to '16-cell' sporangia.

The mechanism by which new genome combinations (and thus new hybrids and species) may arise can be summarised by:

i) Chromosome doubling, either	a)	2 x XX → XXXX (autopolyploidy), or
	b)	2 x XY → XXYY (allopolyploidy),
ii) Sexual hybridisation		XX + YY → XY,
iii) Apomictic-sexual hybridisation		YY + ZZ → YZZ ('ZZ' apomictic).

A typical example of genome analysis is the search for the parent diploid species of a tetraploid species which is believed to be of allopolyploid origin. In a programme of hybridisation, the tetraploid will be crossed with a number of candidate parent species, along with one or more species which are known to be not closely related. If the tetraploid is represented by 'XXYY', then the resultant hybrids with the two parent species 'XX' and 'YY' will be 'XXY' and 'XYY' respectively. In each case, the examination of chromosome pairing in the hybrids should reveal equal numbers of pairs of chromosomes and unpaired chromosomes at meiosis, corresponding to their genomic composition. On the other hand, the hybrid formed with an unrelated species 'WW' will be given by 'WXY', and should show a complete lack of pairing at meiosis. By this means the parent species (if still extant) can be identified. In practice it may not be quite so simple because of other possible reasons for the observed pairing behaviour, but these can generally be eliminated by appropriate studies. The basic process of genome analysis by means of experimental hybridisation was developed by Manton (1950) and has been extensively used in fern studies; an example concerning the *D. carthusiana* group is provided by Gibby & Walker (1977).

Genome combinations can be identified with known taxa in the *Dryopteris filix-mas* group. Of the basic diploid species, *D. oreades* and *D. caucasica* are known to be normal sexual diploids (Manton 1950, Fraser-Jenkins 1976) and may be represented by 'OO' and 'CC' respectively. The third diploid, *D. affinis* subsp. *affinis* is an apomict and almost certainly has two dissimilar genomes, probably one from *D. oreades* and one from an unknown *'affinis* ancestor', possibly closely related to *D. wallichiana* (Fraser-Jenkins 1980), which may be represented by 'OA'. The *'affinis* ancestor' presumably must have been itself a sexual diploid, otherwise the result of the original hybridisation would have been triploid rather than diploid. The apomixis of *D. affinis* subsp. *affinis,* which must have arisen in an original hybrid by some as yet unknown means, allows fertility where there would otherwise have been sterility. The triploid *D. affinis* subsp. *stilluppensis* is known to have one dissimilar and two similar genomes and these are believed to be two from *D. oreades* and one from the *'affinis* ancestor', giving 'OOA'. The other triploid, *D. affinis* subsp. *borreri,* is known to have three dissimilar genomes, which are believed to be one each from *D. oreades, D. caucasica* and the *'affinis* ancestor', giving 'OAC'. The two triploids are believed to have resulted from the hybridisation of the diploid *D. affinis* subsp. *affinis* with *D. oreades* and *D. caucasica* (Corley 1967, Fraser-Jenkins 1980). The most common species of the group, *D. filix-mas,* is known to be an allopolyploid, with two genomes each from *D. oreades* and *D. caucasica* (Fraser-Jenkins 1976), and can be represented by 'OOCC'. It is believed to have been formed by chromosome doubling in *D. x initialis,* which is the hybrid between *D. oreades* and *D. caucasica* (Fraser-Jenkins 1976). It should be said that the attribution of genome combinations described above is not absolutely certain and depends in the case of the *D. affinis* complex upon largely circumstantial evidence from comparative morphology and phytochemistry. However, it is difficult to find any other explanation which fits all the known evidence so well.

Genome combinations in the *Dryopteris filix-mas* group which can be formed by methods described earlier are listed in Figure 3. The three basic diploids are given at the top, followed by the 'second generation' combinations described in the preceding paragraph. These are followed by two further 'generations' of combinations, some of which can be identified with known taxa. Three possible but undetected autopolyploids from the basic diploids are shown. The three hybrids, one tetraploid and two pentaploid, (*'D. tavelii'*) between the *D. affinis* 'subspecies' and *D. filix-mas* can be seen. Similarly there are three combinations which would result from the hybridisation of *D. affinis* with *D. oreades.* The first represents the re-formation of the triploid *D. affinis* subsp. *stilluppensis,* another has the same combination as the tetraploid *'D. x tavelii'* and the third is a new tetraploid as yet unrecognised. The equivalent hybridisation with *D. caucasica* would give the re-formation of *D. affinis* subsp. *borreri,* the *'D. x tavelii'* tetraploid again and another new tetraploid. Further combinations show the pentaploids, hexaploids and heptaploids which would result from 'back-crosses', and the hexaploids which would be derived from chromosome doubling in the *D. affinis* triploids and the two *D. filix-mas* sexual hybrids: *D. x mantoniae* and *D. x euxinensis.* It has been assumed here that the apomictic combinations are, at least partially, fertile but that autopolyploids are not; if the autopolyploids existed and were fertile, they could give rise to a large number of additional and exotic polyploid combinations.

The genome combinations listed in Figure 3 are shown graphically in Figure 4. The triangular graph shows the overall proportions of the three basic genomes: 'O', 'A' and 'C' which are contained within each of the combinations.[3] The scales along the sides of the triangle show the percentage composition. This diagram has the property that the distances between the positions at which the combinations are plotted are directly

[3] If the percentages of each of the three basic genomes are represented by points in a three dimensional co-ordinate system (o0%, aA%, cC%), then the diagram in Figure 4 represents the plane o + a + c = 100% (within the boundaries: o >= 0, a >= 0, c >= 0).

Process	Combination	Taxon Name	Fertility
	OA	*affinis* subsp. *affinis*	A
	OO	*oreades*	F
	CC	*caucasica*	F
OA → OOA ← OO	OOA	*affinis* subsp. *stilluppensis*	A
OA → OAC ← CC	OAC	*affinis* subsp. *borreri*	A
OO → OC ← CC	OC	*x initialis*	S
OC ⇒ OOCC	OOCC	*filix-mas*	F
OO ⇒ OOOO	OOOO		?
CC ⇒ CCCC	CCCC		?
OA ⇒ OOAA	OOAA		?
OA → OOAC ← OOCC	OOAC	*'x tavelii' 4n*	PA
OO → OOOA ← OOA	OOOA		PA?
OO → OOAC ← OAC	OOAC *		
OO → OOC ← OOCC	OCCC	*x mantoniae*	S
CC → OOAC ← OOA	OOAC *		
CC → OACC ← OAC	OACC		PA?
CC → OCC ← OOCC	OCC	x euxinensis	S
OOA → OOOAC ← OOCC	OOOAC	*'x tavelii'* 5n /1	PA
OAC → OOACC ← OOCC	OOACC	*'x tavelii'* 5n /2	PA
OOA ⇒ OOOOAA	OOOOAA		?
OAC ⇒ OOAACC	OOAACC		?
OO → OOOAC ← OOAC	OOOAC *		
OO → OOOOA ← OOOA	OOOOA		PA?
OO → OOACC ← OACC	OOACC *		
OO → OOOOAC ← OOOAC	OOOOAC		?
OO → OOOACC ← OOACC	OOOACC		?
CC → OOACC ← OOAC	OOACC *		
CC → OOOAC ← OOOA	OOOAC *		
CC → OACCC ← OACC	OACCC		PA?
CC → OOOACC ← OOOAC	OOOACC *		
CC → OOACCC ← OOACC	OOACCC		?
OOCC → OOOACC ← OOAC	OOOACC *		
OOCC → OOOOAC ← OOOA	OOOOAC *		
OOCC → OOACCC ← OACC	OOACCC *		
OOCC → OOOOACC ← OOOAC	OOOOACC		?
OOCC → OOOACCC ← OOACC	OOOACCC		?
OOC ⇒ OOOOCC	OOOOCC		F?
OCC ⇒ OOCCCC	OOCCCC		F?

KEY

*	Repeated combination	A	Apomictically fertile
→	Single genome contribution in hybridisation	F	Sexually fertile
⇒	Double genome contribution in hybridisation	S	Sterile
=⇒	Genome doubling	PA	Partially apomictically fertile

Figure 3 — Possible Genome Combinations

proportional to the total percentage difference in genomic composition, i.e. if one pair of combinations is twice as far apart as another pair of combinations, then the first pair has twice the total percentage genomic difference that the second pair has. Thus the distance between two combinations on this graph gives an indication of how 'different' the respective plants would appear. Although this relationship is likely to be only approximate, in the absence of any better and more specific information, it is a reasonable assumption to make. There are some interesting results that become apparent from the diagram. For example, a hybrid is not, in general, genomically equidistant from its parents; *D. x mantoniae* is shown to be much closer to *D. filix-mas* than to *D. oreades,* a result which is reflected in its morphology. The *D. affinis* subsp. *stilluppensis* hybrids and *'D. x tavelii'* can be seen to form a loose cluster, with most members closer to each other

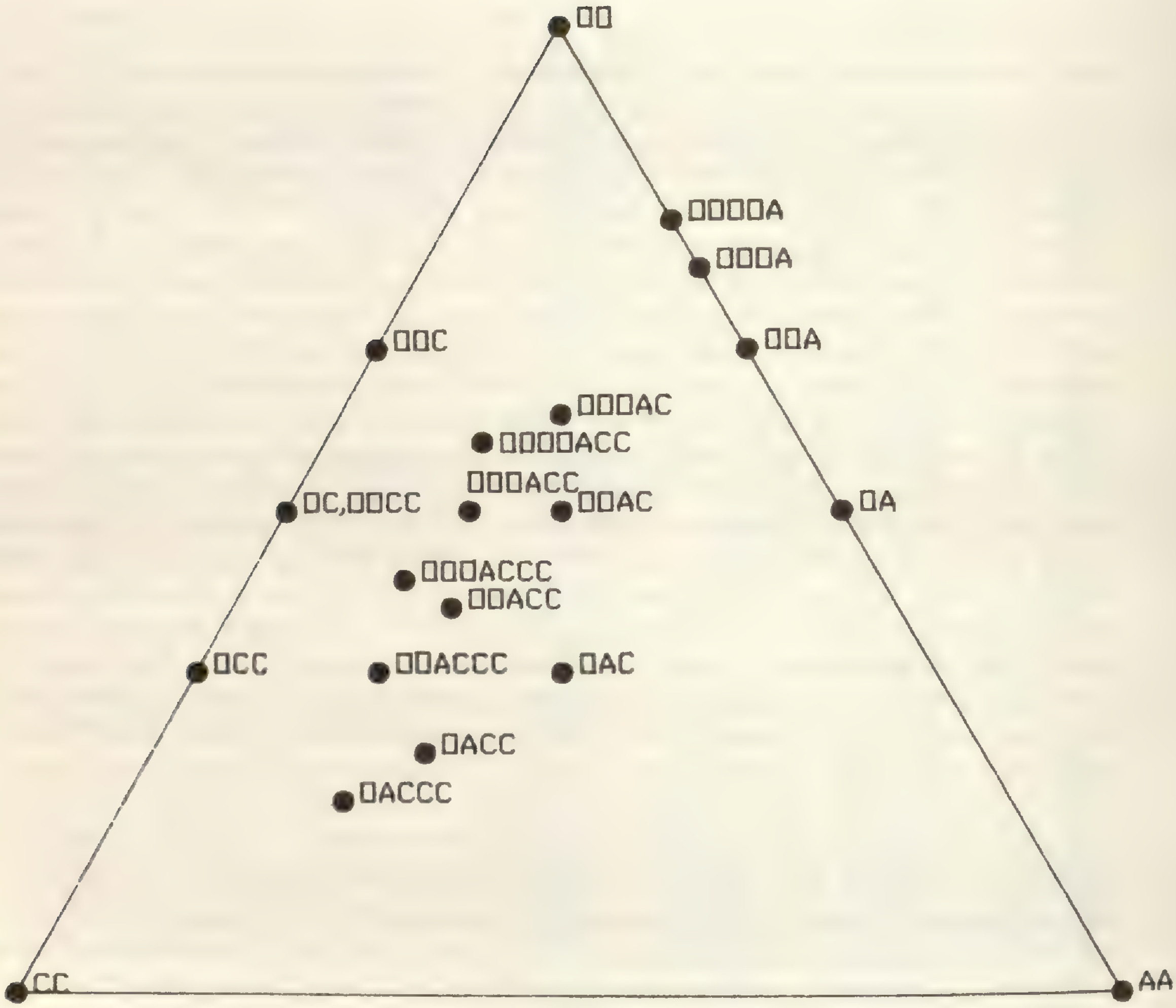

Figure 4 — Triangular Graph of Genome Combinations

than to the basic diploid species. The addition of higher polyploids increases the density of genome combination within a tightly defined area on the graph. The restricted area is due to the fact that the 'A' genome does not participate in sexual hybridisation but only contributes a single genome in any combination through its apomictic processes.

It might appear that discussion of possible new genome combinations is very hypothetical and therefore not to be taken too seriously. However, like other sciences, pteridology should proceed in a cyclic manner, with field and experimental observations being explained by theory, which in turn makes further predictions to be tested by field and experimental observations. Are those new combinations out there, somewhere?

Acknowledgements:
I am grateful to Dr Mary Gibby and to Clive Jermy for their useful comments during the preparation of this article.

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JUST FANCIES

R. & R. COUGHLIN, 17 Alvechurch, Highway, Lydiate Ash, Bromsgrove, Worcestershire B60 1NZ

The Lickey range of hills is no place for the fern enthusiast; you could walk the whole area and find only the odd plant and of course plenty of bracken. It is surprising that ferns are so scarce, because the Lickey Hills are one of the greatest water sheds in Britain, also the soil is light and loamy and contains Bunter pebble.

We live on the southern side of the range, and our soil is much the same, but, surprisingly, we are able to grow most of the species and varieties of ferns with a modicum of success. We have always been very keen gardeners, our main interests being alpines and rhododendrons, and had always included the growing of smaller ferns, the spleenworts and polypodies etc; in the rock garden. So when Reginald Kaye published his *Hardy Ferns* in 1968 we were intrigued. We wanted to grow and enjoy some of the larger and more exotic varieties which he had written about, and to try and incorporate them into our shade area under the rhododendrons instead of the usual ground cover of vincas and ivies. At the end of his book there is a paragraph about the BPS and the last part suggests that anyone requiring more information about ferns should write to the Secretary (Jimmy Dyce).

This we did and received a warm letter in response and an invitation to attend a field meeting at Bromyard a month later; the warmth and friendliness we received at that meeting was very encouraging and it still remains throughout the society.

Now, like all the specialised sections of gardening, comes the question of where to be able to purchase or obtain some of these beautiful and rare plants. Our first visit was to Reginald Kaye's nursery at Silverdale where we were able to start our initial collection of cultivars. The next trip on our list was to Southport, our prime objective being the BPS Stand and the fern section in the show itself, quite an eye-opener to us, and once again the question arose, where to obtain more of these delightful plants? This developed into a whispering campaign between the older members of the society, with lots of promises, which were later fulfilled.

Now with our appetites well and truly whetted we were still searching for the more delightful variants, so the natural progression from gathering together a collection of fern varieties was to grow from spores, and our first choice, as with most amateurs, was the lady fern *Athyrium filix-femina* which we all know throws more variants than other species.

First we collected spores from the plants we wished to increase and hopefully improve upon. Then, on to the propagation, and the method we used was as simple a method as we could find, and with us proved to be fairly successful. Take 3 to 3½" plastic pots, of good quality, (or they will warp with this method). Fill them almost full with fern compost, which for us is two parts loam, two parts peat and one of coarse sand, then press lightly down to half an inch from rim of pot. Then cut circles of perforated paper (kitchen towels are ideal) and place on top of pots, then pour boiling water over the paper until the water comes from the drainage holes in the pots as hot as the water going in. Leave pots covered for at least a day to settle and stabilise before planting. The reason for using the perforated paper is to prevent disturbance of the soil when pouring on the water. This method (with modern modifications) was used for the propagation of spores in the late 1800s. Sow spores as thinly as possible then cover the pots with clean glass, and keep covered to hopefully remain as sterile as possible. Do not allow the pots to become dry, and when water is required, water from the base of the pot. The next step when development has commenced is to pick out the prothalli into trays of sterilised compost, (then the fun begins). The fronds begin to appear and develop and you are then able to select the different forms you wish to grow on, at the same time also, discarding the many misfits.

The plumose athyriums illustrated were grown from spores of *Athyrium filix-femina* 'Plumosum Penny' which also produced *A.ff.* 'Kalothrix' (B.P.S. Bulletin 1983). The first three illustrations are a selection of *A.ff.* 'Plumosum', all of them tripinnate.

A.ff. 'Plumosum dissectum' (60cm.) is perhaps in some ways similar to *A.ff.* 'Kalothrix', fine and slightly lax in growth but a much more vigorous grower than 'Kalothrix'.

A.ff. 'Plumosum falcatum' (50cm.) to our minds a typical classic shape of fern, the pinnae curved giving it a fish-tail effect; unfortunately not a strong grower, must try moving it and give it a little more sunshine.

A.ff. 'Plumosum Lydiate' (85cm.) large robust grower, very dark green in colour with red stems, altogether a very handsome plant.

A.ff. 'Plumosum superbum Lydiate' (60cm.) this is one of our best plumose forms, bold, red stemmed and heavily crested.

For our sowing of *A.ff.* 'Victoriae' we chose a very small fine plant (30cm.) for spores, so slender it is almost linear; surprising to think that the two plants illustrated and completely different, came from this smaller than usual variety of *A.ff.* 'Victoriae'.

A.ff. 'Setigero-Victoriae Lydiate' (50cm.) this fern has the merits of *A.ff.* 'Setigerum' and *A.ff.* 'Victoriae', the large fan shaped crests of 'Setigerum' with the cruciate and cristate pinnae of 'Victoriae', and like all the 'Victoriae' section has to be seen in its third dimension to be really appreciated. (See also front cover.)

A.ff. 'Victoriae Lydiate' (80cm.) this is the largest *A.ff.* 'Victoriae' we have grown, it displays its latticed appearance to perfection, possibly because it is so lanceolate, crisp and clean cut.

Although three of the next ferns illustrated are cristate all were from the same batch of sporelings of *A.ff.* 'Percristatum'.

A.ff. 'Flabelli-pinnulum' (50cm.) star-shaped quite spiky pinnae.

A.ff. 'Cristatum' (80cm.) another quite bold plant, lanceolate and lightly crested.

A.ff. 'Longipinnulum' (75cm.) long pinnae, pinnules close together and all crested.

A.ff. 'Percristatum superbum Lydiate' (100cm.) the largest of our athyriums with very broad fronds, heavily crested, bold appearance and striking, but has to be supported, as do many of the larger growing lady ferns.

We feel we must now put a little addendum to our descriptions, principally to encourage perhaps other members to grow from spores, these are three verses, part of a poem taken from the British Fern Gazette, March 1913, written by C.B. Green.

Of Lady Ferns I find a few,
Of varied make or fashion,
But none with plumy foliage,
Reciprocates my passion.

But must I be content to glean,
The normal or inferior?
By no means while the spore remains,
To breed me forms superior.

To these I'll turn with careful choice,
Nor longer vainly roam;
But, sowing from the best create,
Rich hunting grounds at home.

(All varieties named jointly by R. & R. Coughlin, J.W. Dyce and M. Rickard.)

Fig. 1. a) *Athyrium filix-femina* 'Plumosum dissectum', pinna.
b) *A. filix-femina* 'Plumosum falcatum', pinna.
c) *A. filix-femina* 'Plumosum Lydiate', pinna.
d) *A. filix-femina* 'Plumosum superbum Lydiate', pinna.
e) *A. filix-femina* 'Flabelli-pinnulum , pinna.

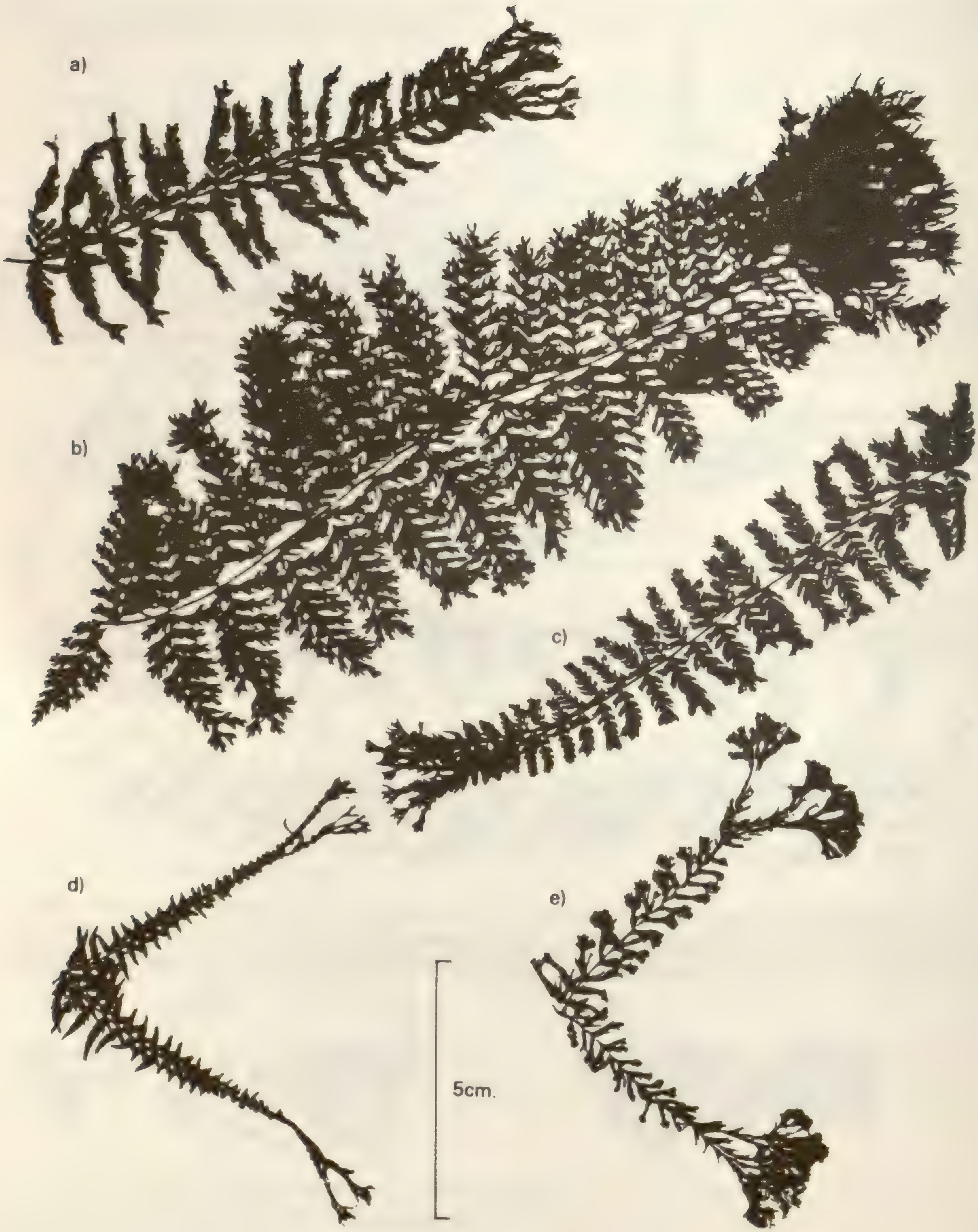

Fig. 2. a) *Athyrium filix-femina* 'Longipinnulum', pinna.
b) *A. filix-femina* 'Percristatum superbum Lydiate', pinna.
c) *A. filix-femina* 'Cristatum', pinna.
d) *A. filix-femina* 'Victoriae Lydiate', pinna.
e) *A. felix-femina* 'Setigero-Victoriae Lydiate', pinna.

BOOK REVIEW

GUIDE DES FOUGERES ET PLANTES ALLIEES by R. Prelli, Editions Lechevalier, paris, 1985. 199pp. 79 text figures including black and white photographs and line drawings, 14 x 20 cm.

Fern students and fern lovers in Britain are very fortunate, so many books have been written on their favourite subject. In a recent note (*Pteridologist:* Vol I, Part I) Martin Rickard says that he can think of well over 30 books on the ferns of the British Isles. This is not the case for France where pteridophyte floras are few and far between. De Rey-Pailhade's *Les Fougères de France* (1893?) and Tardieu-Blot's *Pteridophytes* (1954) are sometimes quoted but rarely seen as they have long been out of print. However, a renewed interest in ferns in France has resulted in the following publications: *Les Ptéridophytes de la France* (1979) by Frédéric Badré and Robert Deschatres, an annotated list of all the species growing in Continental France and Corsica, which provides much needed data; and the long awaited *Guide des Fougères et Plantes Alliées* by Rémy Prelli (1985), which answers Martin Rickard's question (*Pteridologist:* Vol I, Part I) "Which Book?", for French pteridologists!

This manual which follows the format of *Welsh Ferns*, can be divided into two parts. The first seventy or so pages sum up all the information to date about the Pteridophyta in a very readable style. The chapter "biologie de la reproduction et évolution actuelle" which touches upon such complex subjects as hybridity and polyploidy is set in a very clear and concise manner. The second part gives a list of all the native pteridophytes in Continental France and Corsica, with a few alien plants naturalised or established, in just over 100 pages. This list claims 113 species and two apogamous hybrids (*Dryopteris* × *remota* and *Dryopteris* × *ardechensis*) are given full species status together with *Diphasiastrum* × *issleri* and *Diphasiastrum* × *zeilleri* which, though recognised as of hybrid origin, are also treated as full species. *Asplenium cuneifolium* is included in the list although the author acknowledges that according to Anne Sleep's research, its presence is very doubtful.

Each species is briefly described and is illustrated either by black and white photographs or line drawings showing diagnostic characters. Ecology and distribution are also given for each plant. The scarcity of hybrid descriptions and illustrations — only *Asplenium* × *alternifolium* receives full treatment — is to be regretted but it only reflects the fact that fewer hybrids have been studied in France than in Great Britain which after all leads the world in fern flora investigation. This is a minor flaw, however, compared with the enormous advantage of having, at last, in one volume, a list and description of all the French species.

It is to be hoped that this work will encourage more thorough field investigation of the pteridophyte flora in France and lead eventually to the publication of an atlas of distribution. This book (written in French of course) comes in hardback and sells in the region of 140 Frs. which is expensive by British standards but is certainly a "good buy" for pteridologists holidaying in France.

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A. LABATUT

IN A GLOUCESTERSHIRE GARDEN

MARY POTTS, 4 Kennel Lane, Webbington, Axbridge, Somerset

The garden at Robin Hill, Stinchcombe, has featured in many reports of the South West regional meetings over the last few years. For family reasons Philip Coke has decided to give up the garden and move house; some of his fern collection has been distributed to members of the fern society. Below follows a short description of his garden as a reminder to those many members and friends who visited the herbal treasure trove at Robin Hill.

The house and garden belonging to Philip and Mary lay on a westward slope to the south of the village of Stinchcombe. The front garden, inclining upwards from the road, contained a catholic selection of plants, many types of rose, shrubs, herbaceous plants, ground cover and some magnificent fern specimens. The photograph (Fig. 1 opposite) shows a fine plant of *Polystichum setiferum* 'Divisilobum' at the turn of the drive and ranged round were mature specimens of *Asplenium scolopendrium* and various other polystichums. A small lawn surrounded by shrubs gave view to an underplanting of male and lady ferns, including some particularly fine examples of the latter of Philip's own raising. Edging the lawn were a number of *Athyrium* varieties of the 'Caput-medusae' type, innocently posing as parsley.

The greater part of the fern collection grew in the back garden and lay on a much steeper bank at an angle of 45°. A small level terrace across the centre contained the vegetable and salad garden (it was at Robin Hill that we first tasted the delights of 'ferny' salad bowl lettuces, and courgettes used as a salad vegetable). Close to the house a bank of limestone rocks accommodated some *Asplenium* varieties, and *Adiantum venustum* above the pond (see Fig. 2 opposite). Following a steep path up the garden the fern enthusiast came upon a bed planted with a mixture of native ferns including a large and thriving plant of *Polystichum lonchitis*.

Sandwiched between the vegetable garden and compost heap was an ever changing and fascinating collection of *Asplenium scolopendrium* varieties. Philip spent a lot of time raising harts'-tongues from spores and his diligence was repaid by the appearance of some remarkable frond forms. Some of the most interesting varieties were only a few inches high on maturity, with stiff, ramose fronds. The plants that consistently fascinated visitors were the variegated and gold harts'-tongues. Philip has green (or gold) fingers as far as these desirable plants are concerned; when transplanted to other gardens they either looked chlorotic or turned green.

The top banks of the back garden housed a collection of native ferns, with a few well grown examples of foreign ferns, such as *Dryopteris wallichiana* (see Fig. 3 opposite p.111) and *Dryopteris erythrosora* — the latter a particularly good form with bright red fronds. Some areas of the back garden were very picturesque, polypodies underplanted with ivies in variety, and woodland steps edged with *Adiantum pedatum* 'Subpumilum'. A border specially formed to grow tender ferns during the summer was one of Philip's recent projects, and contained *Blechnum, Cyrtomium* and some Australian *Polystichum* species.

Another speciality of the Robin Hill fern collection was the adiantums — many varieties collected in Australia. Two cool greenhouses contained many varieties of these charming plants, the most remarkable being those red-fronded forms with diminutive pinnules, and the variegated plants.

Philip's generosity has been recorded in previous articles; there are many members and friends whose gardens have been enhanced by gifts from Robin Hill, and some of us are gratefully aware that the nucleus of our fern collections originated in that Gloucestershire garden.

Polystichum setiferum 'Divisilobum' at Robin Hill, Gloucestershire
(photograph by Christopher Potts)

Adiantum venustum at Robin Hill, Gloucestershire
(photograph by Christopher Potts)

Gymnocarpium robertianum in Cheddar Gorge
(photograph by Christopher Potts)

Dryopteris wallichiana at Robin Hill, Gloucestershire
(photograph by Christopher Potts)

SHORTER NOTE

Gymnocarpium robertianum in Cheddar Gorge (or another Jimmy Dyce story)

The accompanying photograph shows a large mature frond of *Gymnocarpium robertianum,* the Limestone Polypody, growing in Cheddar Gorge. When we first joined the British Pteridological Society fifteen years ago we described to Jimmy Dyce our futile attempts to discover this fern on Mendip. We were rather surprised to hear that he knew exactly where it grew; he described in detail a location at the top of Cheddar Gorge where he had seen it growing in abundance thirty years previously when he was stationed at RAF Locking. We doubtfully examined the site by a wall at the edge of the road and were amazed and delighted to discover the fern for ourselves exactly as Jimmy had described it. Most Mendip walls are now in a state of disrepair, and this appears to suit the Limestone Polypody admirably, as in this location it is still increasing and forcing its small and graceful croziers through the fallen stone. It gives us pleasure to record this, as many of the scree sites recorded in the old floras are now barren of this fern.

MARY AND CHRISTOPHER POTTS

SHORTER NOTE

The Propagation of Adiantum caudatum from Bulbils.

One of my recent 'garden centre finds' was a very attractive fern with long 'linear-attenuate' fronds of a decumbent habit. Many of the frond tips carried 'bulbils', tiny adventitious buds, that slowly developed fronds of their own giving the entire plant a very graceful and attractive appearance.

Having purchased a plant for my collection it proved to be the 'Trailing maidenhair', *Adiamtum caudatum* and I replanted it into an 8 inch (200mm app.) hanging basket which I felt would be best way to display this pendant fern.

It grew well and within a few months it had grown to 3 times its original size. Careful examination of the bulbils shows a small bud with a mass of tiny root initials awaiting the right conditions for growth.

Many visitors to my collection have admired it and several begged a frond or two hoping to start off their own plants. Surprisingly, in every case the bulbils failed to develop and grow. I tried them myself by removing fronds from the plant and pegging them down in a peat/sand mixture and putting them under the mist unit. Still they failed to develop.

I could not understand their reluctance to develop as bulbils from such ferns as *Asplenium bulbiferum, Cystopteris bulbiferum* and some varietal forms of *Asplenium setiferum* readily develop when the frond is removed from the parent plant and pegged down on a suitable compost.

After some experimentation, I found that I could propagate my trailing maidenhair quite easily from bulbils if the frond is allowed to remain on the plant, and a pot or tray of compost (I use 50/50 peat and perlite or sharp sand, by volume) is placed alongside the plant and the frond tips with the bulbils are pegged down into it with a small loop of wire. In this way I can obtain well-rooted plantlets in 8-10 weeks at 70F (21C).

Presumably it would take a longer period to obtain well-rooted plants if they are grown at lower temperatures, however, they are unlikely to survive temperatures lower than 45F (7C).

A.R. BUSBY

VEGETATIVE REPRODUCTION IN FERNS

MARTIN RICKARD, The Old Rectory, Leinthall Starkes, Ludlow, Shropshire SY8 2HP

To the general gardener and specialist fern grower alike the vegetative reproduction of garden plants is of fundamental importance. It allows multiplication of stocks with a minimum of effort and, more significantly, since many garden varieties do not breed true, it allows the production of stocks almost certainly true to the character of the parent plant. Of course in the case of sterile plants normal sexual breeding is totally out of the question.

There are four ways of building up fern stocks vegetatively:—

1. By division of mature plants,
   a) plants with creeping rhizomes,
   b) plants with erect rhizomes.
2. By bulbils,
   a) normally occuring bulbils on leaf,
   b) artificially induced bulbils on leaf bases.
3. By apospory
4. By tissue culture

1. Reproduction by plant division

a) plants with creeping rhizomes

Division is straightforward; simply remove an inch or two of rhizome ensuring that there is at least one growing point on the selected piece. Obviously, disturb the roots as little as possible. It is best to use a sharp knife for this operation.

Examples of plants which may be propagated in this way are:

Adiantum x mairisii, A. venustum, Asplenium darioides, Blechnum fluviatile, B. penna-marina, Botrychium lunaria, Cystopteris montana, C. sudetica, Gymnocarpium dryopteris (including the plumose form), *G. robertianum, Lycopodium spp., Matteuccia struthiopteris, Onoclea sensibilis, Ophioglossum vulgatum, Phegopteris connectilis, P. hexagonoptera, Pillularia globulifera, Polypodium spp.* (all hardy species and hardy varieties; with some varieties of *P. vulgare* in the 'Cornubiense' section always choose a growing point in true character), *Thelypteris palustris, Trichomanes speciosum* (together with other British filmy ferns this is a special case needing to be grown in very high humidity).

The method to split a pot grown plant of *Adiantum spp.* is shown in photographs on pages 61 and 62 of *Ferns for Garden and Greenhouse* by Macself. He prises the plant into small pieces using a small fork. This same system would apply equally well to border grown *Adiantums* as well as many other species.

b) plants with erect rhizomes

This includes the majority of ferns with the normal shuttlecock form of growth which produce side crowns. In some forms this can be a slow process with it perhaps taking several years to produce one offset. In others, side crowns can be produced so prolifically as to prevent the plant realising its true potential, e.g. I have never seen *Polystichum setiferum* 'Pulcherrimum Moly's Green' in character unless it is kept as a single crown (even then only the odd frond or part of a frond has been truly pucherrimum!)

Examples of plants which can normally only be reproduced in this way are:

Polystichum setiferum

'Plumosum Bevis' — some progeny from spores very rarely similar to parent, but probably not identical.

'Plumosum Grande Moly' — very slow. 'Pulcherrimum Moly's Green'.
'Plumosum Green' — once raised from 'Plumosum Bevis', can very rarely produce bulbils. In my opinion one of the most handsome of all garden ferns.
'Gracillimum' — raised from 'Plumosum Bevis'.

Athyrium filix-femina

'Plumosum Druery' (but see adjoining article by Vic Newey).
'Plumosum Coke'. 'Plumosum Penny'. 'Clarissima Jones'.

Dryopteris filix-mas

'Bollandiae' — the closest to a plumose fern yet discovered in *Dryopteris*.
'Ramosissima Wright' — possibly a variety of *Dryopteris affinis*.
Several hybrids including:
Asplenium × alternifolium, Asplenium × costei, Asplenophyllitis microdon

All these varieties and hybrids are uncommon because the production of side crowns is usually a slow process. By a strange quirk of fate this list includes some of the very best fern varieties we still have in cultivation. Some of these may occasionally be available at specialist nurseries but quantities will always be limited. Those of us who have any must therefore do our best to distribute them among other enthusiasts whenever possible.

In *Ferns for Garden and Greenhouse,* page 66, Macself gives a full account of how to separate crowns. By reading this some useful tips may be gleaned, but I don't think any disastrous mistakes are likely if normal common sense is used.

Of course this technique is not restricted to only the rare treasures, but I should perhaps make two cautionary points — firstly, take extra care with Scollies, they can often be difficult to split cleanly, and secondly beware of the problems of some Aspleniums. Reg Kaye *(Hardy Ferns,* p. 108) describes a disaster he had when trying to split the only plant of a form of *Asplenium trichomanes* 'Incisum' found by J. Barnes, after the division *all* pieces died and so therefore that was the end of that variety. Conversely, I find *Asplenium* hybrids split easily, e.g. *A. × alternifolium* and *A. × costei.*

2. Reproduction by bulbils

a) bulbils occuring along the leaf rachis

Although relatively few ferns produce bulbils some good varieties can be propagated by this means. Simply lay the bulbiferous leaf onto soil; it may still be attached to the plant, or preferably detached and laid in a pan. It is important to ensure that the bulbils make good contact with the soil so that developing roots do not dry out. Equally it is important to ensure that the crown of the bulbils,and any young fronds, are not covered by soil as they need to receive light. If completely buried there is a good chance that rot will set in and kill the young plant. Examples of plants which can be propagated from bulbils are:—

Polystichum setiferum

'Iveryanum'
'Divisilobum Bland' — bulbils sometimes difficult to strike.
many other 'Divisilobums', 'Acutilobums' and 'Multilobums' — some forms only sparingly bulbiferous even when well grown.
'Plumoso-multilobum'
'Plumoso-divisilobum' — bulbils only seem to be produced very sparingly, and even then only on well established plants; perhaps one bulbil every 2 or 3 years.
'Plumosum Green' — very sparingly as above.

Polystichum proliferum and hybrids produced from it.
Asplenium flabellifolium — from New Zealand
Asplenium tripteropus — from Japan
Asplenium rhizophyllus — from North America
Adiantum edgeworthii — from Japan

} Like *P. proliferum* all these are bulbiferous towards the tip of the frond.

Asplenium scolopendrium — bulbiferous leaves are very rare but have been reported once or twice, including quite recently.

Huperzia (Lycopodium) selago — the upper parts of most stems bear little bulbils or gemmae, these readily fall from the plant and in suitable conditions will root and grow.

b) artificially induced bulbils on leaf bases

Asplenium scolopendrium and its varieties produce this type of bulbil. The bulbils are rarely, if ever, visible until appropriate steps are taken to aid their development. Curiously, this method seems to be immersed in a mystique which deters all but a few members from trying it. In reality it is a simple and quick way of building up stocks of scollies which could otherwise only be multiplied by splitting off side crowns. My system has been borrowed from many sources — notably Mary Potts, I proceed as follows:—

1. Clean plant by removing as much soil as possible, as well as unnecessary roots.

2. Peel old leaves downwards so that they snap cleanly at their point of contact with the caudex. These leaves may be several years old and look dead, but when separated they will be seen to be plump and green if only for the bottom ¼ inch or so of their length.

3. When all leaf bases have been removed carefully, split the plant into crowns if desired or simply replant it as it is. It is unlikely that it will suffer any noticeable setback.

4. Remove the live basal section of each detached leaf to a maximum length of about one inch but probably less, wash it and plant it *upside down* in a pan of sterilized compost. By upside down I mean plant so that the end that was attached to the caudex is sticking up out of the soil by ⅛ to ¼ of an inch.

5. Keep the pan close by placing it under a clean sheet of polythene and misting with water as necessary. Close inspection will soon reveal the production of small green blisters around the tip above the soil — sometimes as many as 10 per leaf base. Each of these will develop into a young fern given good husbandry.

6. Leave to develop into recognisable plants, perhaps ½ an inch high, before carefully teasing them off the leaf bases and pricking out in the normal way.

In summer this whole process might be completed in three months but over winter growth is, of course, much slower. As I write I have about 250 bases neatly panned out from a single plant of *Asplenium scolopendrium* 'Crispum Bolton's Nobile' I lifted briefly in the autumn. Already I have more than 250 bulbils formed (after 3 winter months), but as yet no recognisable young plants. Previous experience tells me I will not get 250 mature plants from this batch, but I put that down to incompetence! There is no reason why a careful grower should not get almost 100% success.

It is reported that this technique also works on certain other species. William Cranfield (past President of our Society) in *British Fern Gazette* Vol. 7, No. 12, p.298, 1950 gives details of how this method can be used to raise *Oreopteris limbosperma, Athyrium filix-femina* and *Polystichum setiferum* as well as *Asplenium scolopendrium.* Apparently *Oreopteris* is easy to bud as with *A. scolopendrium.* With *A. filix-femina* a portion of the old caudex should be removed with the base. No specific tips for raising *P. setiferum* by this technique are given but it appears to be much more difficult.

Lady ferns can also rarely produce bulbils on their leaves. Reference to this in early issues of our *British Fern Gazette* have been pointed out to me by Ray Coughlin. In Vol. 1, p.269 (1912) Druery mentions that the plumose lady fern *Athyrium filix-femina* 'Axminster' bears bulbils associated with the spore heaps, while in Vol. 3, p.134 (1916) Druery confirms that this is true of most plumose lady ferns. More recently, Vic Newey has dramatically demonstrated the presence of bulbils on some of his lady ferns (see adjoining article).

3. By apospory

This is a method of reproduction which is possible in a few, usually very choice, varieties,

e.g. *Athyrium filix-femina* 'Clarissima'
Asplenium scolopendrium 'Crispum Fimbriatum'
Polystichum setiferum 'Pulcherrimum'

I have never tried this technique; however, I gather that young plants produced this way are often depauperate and perhaps not worth the effort! If anyone is interested in pursuing it, may I suggest they read C.T. Druery's writings on the subject. These are widely scattered but a good introduction can be found in the final pages of the *Book of British Ferns* published in 1903 (with the support of the BPS).

4. By tissue culture

I really only put this in as an aside, it is a technique for the specialist. Even then, so far as I know, no one has been able to propagate our rare varieties of ferns by this process. I have been told that the problem is complicated by many ferns being infected with viruses which contaminate the growing medium.

While, from the above, I hope it is clear that most ferns can be propagated vegetatively, it must be pointed out that in many situations vegetative reproduction is far from being the ideal way to raise ferns. The benefits of fern propagation sexually from spores are well shown by the range of new forms raised by some of the best growers. Also the tendency to produce only one or a few daughter plants at a time has contributed to the great rarity of many of our best cultivars, e.g. *A. filix-femina* 'Clarissima', *A. filix-femina* 'Victoriae' (original clone) etc. These ferns can only be reproduced true to character by the removal of side crowns — which are, sadly, produced all too rarely.

BULBIL PRODUCTION ON LADY FERNS

VIC NEWEY, 27 Watts Road, Studley, Warwickshire

A number of years ago I purchased a plant of *Athyrium filix-femina* 'Plumosum superbum Druery' (ex Whiteside collection) and after several years I noticed on some of the late season fronds the appearance of tiny bulbils scattered generally upon the back of the pinnules on the lower half of the fronds. Although I layered the frond under glass only three of the resulting plantlets survived the inevitable withering of the parent frond. These have grown to be just like the parent and were exceptionally beautiful when very small.

This year I again noticed the same thing and in September I layered a frond upside down in gentle heat. The result has been remarkable. There are now hundreds of plantlets developing like a bright green forest on the back of the frond and I see no reason why these should not survive. This is definitely not a form of apospory but a direct proliferation in the manner of certain *Polystichums* etc.

A similar thing on a much smaller scale is occurring on plants raised from a robust form of *Athyrium filix-femina* 'Victoriae'. The sporelings from this are quite unusual; some are useless, some are partly cruciate and inconstant and one or two are crested in the manner of *A.f.* 'Victoriae' with very narrow pinnules. Some of the prothalli from the original sowing, however, grew exceptionally large and produced nothing until the following (this) season, when a plant appeared growing from the topside of a prothallus. This grew steadily during the summer and I noticed the appearance of white bulbils at the junction of the pinnae and rachis on the tiny fronds. These have been

pegged down and are producing fronds. I await next season to see their development. The parent plant is now about six inches high and looks very unusual; the pinnules start very slender and fan out in a very attractive manner quite unlike anything I have ever seen before. The fronds are slightly variable in that the pinnules are irregular on one or two of the fronds, but I am hoping this will improve later.

Footnote: On seeing this note — Jimmy Dyce comments that this last mentioned plant sounds like a form of 'Grandidens' — see his article elsewhere in this issue. Matt Busby and I have seen the plants and plantlets referred to here; it really is an amazing development. How come the rest of us have seemingly been blind to these bulbils for so many years? *Ed.*

BOOK REVIEW

ECOLOGICAL FLORA OF THE SHROPSHIRE REGION by C.A. Sinker, J.R. Packham, I.C. Trueman, P.H. Oswald, F.H. Perring and W.V. Prestwood, 1985. pp.xvi, 344 with eight colour plates by Anne Gilbert and other sketches by Lindsay Brown. 210 x 295mm. Shropshire Trust for Nature Conservation, Agriculture House, Shrewsbury, ISBN 0 9508637 OX. Price £23.

Charles Sinker, in his Preface to this book, defines plant ecology as "the study of what grows where, and why, ... and when, and how, and how much", pointing out that the subject has elements of interest for almost anyone. In his list for whom this book is written he includes the "weekend gardener and country-lover" as well as dedicated botanists. As most gardeners know ecology is the understanding of what can grow where, so do not be put off by the title of this book. It is a fascinating and very readable account of plants (ferns included) in Shropshire, and their relationship to the variable environment found in that area.

The first 76 pages discuss the Background: the organisation of the 10 year survey that produced this book; the history of botanical recording; and the general environmental background. Historical recording began with observations made by John Leland (c.1506-1552) who was Henry VIII's Keeper of Libraries. Did he, one wonders, see *Pilularia globulifera* in the "veri faire poole" at Brown Moss (where E.M. Rutter and C.A. Sinker found it in 1963)? It is remarkable how that plant lingers for hundreds of years. But the rambles and often the life-histories of a further 80 botanists — including William Phillips (1822-1905) who made the first county list of pteridophytes — make much interesting reading.

Part 2, another 107 pages, describes habitats and plant communities found in Shropshire and this has many tips for the wildlife gardener. Part 3 (pp. 163-318) contains the "Flora" proper — i.e. the account of the distribution and ecological requirements of the 731 vascular plants found there — some 44 species of pteridophyte with dot maps for most of the species. We are reminded that the area included in the survey is not only v.c. 40 (Shropshire) but also portions of adjacent v.c.'s (36, 37, 39, 43, 47, 50 and 58) which are included in the rectilinear frame between grid squares 32/16; 32/86; 33/14; 33/84. There are some gems of information in the fern part and many more in the latter part of the book, but I do not want to spoil the fun for the reader by listing them. No one possessing this book can fail to be stimulated about what can be observed in even the dullest area (not that this county contains much dull country) or about the commonest plant. Do not deprive yourself of at least a view of this book. Ask your library to get it — and once seen, you will want your own copy.

CLIVE JERMY

THE 'GRANDIDENS' SECTION IN ATHYRIUM FILIX-FEMINA AND POLYSTICHUM SETIFERUM

J.W. DYCE, 46 Sedley Rie, Loughton, Essex IG10 1LT

A similar type of variation appears in both *Athyrium filix-femina* and *Polystichum setiferum*. It is characterised by depauperation and deficiency, and in the vast majority of cases is fit only for augmenting the contents of the compost heap. It is found both in the wild and in spore sowings, but among the large number of utterly ragged and disreputable specimens there does appear the occasional one which has a certain charm and attraction, owing to the depauperation, being on a regular pattern and presenting a somewhat "lacy" appearance to the eye. I may apologise for growing them but both I and other fern growers who see them have to admit their attraction.

In the early days of fern interest it seems that collectors, as a whole, were less fussy about their standards than we are today, and in the old fern books, and also in the Jones Nature Prints, many so-called varieties are depicted which should have been "strangled at birth" and not allowed to swell the volume of fern literature. Even Druery and some of his prominent contemporaries in the fern world were at times guilty of descending to the level of the enthusiastic collector whose main ambition seemed to have been to collect fern names rather than the actual ferns, and in so doing gave names to much worthless rubbish.

What can be regarded as a type plant to cover this kind of variation in both *A. filix-femina* and *P. setiferum* is *P. setiferum* 'Grandidens' depicted in Druery's *British Ferns and their Varieties,* page 202. (See Fig. 1c). No doubt this actual plant has long ago disappeared from cultivation. Druery stated that the form had been repeatedly found but, although marred by irregularities, the subdivisions were so deeply toothed and peculiar that it figured in all collections. In both species it is characterised by fan-shaped, deeply lacerated and spinose pinnules.

As far as I know no *named* specimens from the past have survived in *A. filix-femina,* but doubtless there are few collections which do not have at least one such plant, gathered in from the wild or found, self-sown, in some odd corner of the garden — they love to appear in wall crevices. At the moment I have several awaiting final judgement — the border or the compost? — when they develop their true character. No two are ever quite alike but all conform roughly to the type in shape of pinnules and varying degrees of depauperation. I grow a very attractive one with extremely spiny pinnules, which I have named 'Spinosissimum' (See Fig. 1a). Reginald Kaye grows a very good example which cropped up as a sporeling many years ago in one of his orchid pots. Named 'Crispum Grandiceps Kaye', it is depicted on page 68 of the 1985 *Pteridologist* (Vol. 1 part 2) and was well-worth preserving in spite of its obvious deficiencies. I can well understand how it gives pleasure to Reg every time he passes it in his nursery.

Although more common in *A. filix-femina,* named specimens seem to be non-existent, but in *P. setiferum* the now deceased type plant, 'Grandidens' was deemed worthy of a name and we have others, still in existence. The best-known is 'Flabelli-pinnulum', a most attractive fern which can be found in most collections (see Fig. 1b). It is very variable, no two plants being exactly alike, both in their size and in their pinnule shapes. Some look obviously depauperate but in an acceptable way; in others you have to look closely to detect the deficiencies. The illustration is from one of the plants in my garden.

Another named variety, still in cultivation, which I consider can also be included in the 'Grandidens' section, is *P. setiferum* 'Manica-infantis'. Although not so extravagantly ragged in its division, and named because of the fancied resemblance of the pinnules to an infant's glove, it does, in plants I have seen, have a certain amount of raggedness and inconstancy in the shape of the fanned pinnules.

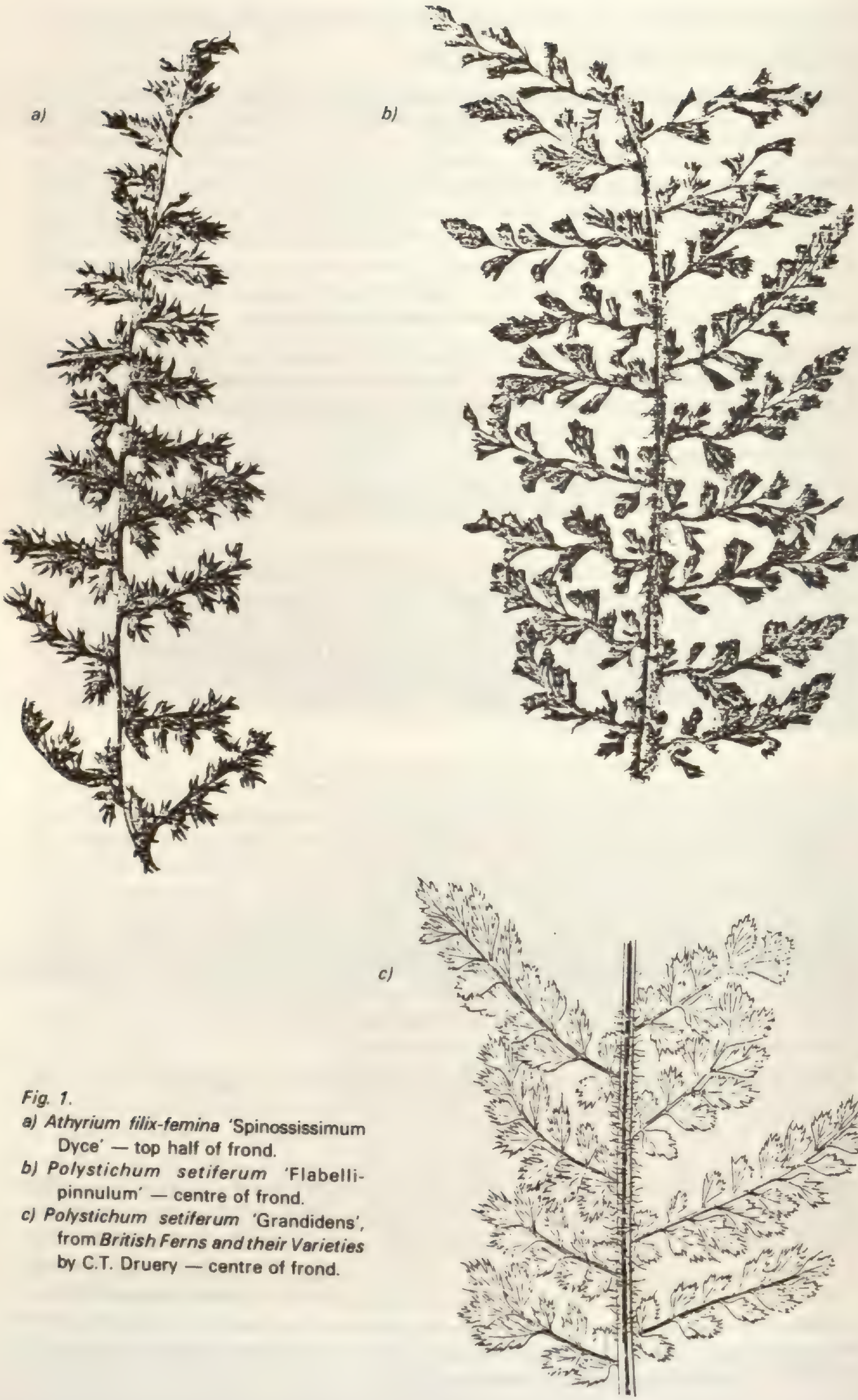


Fig. 1.
a) Athyrium filix-femina 'Spinossissimum Dyce' — top half of frond.
b) Polystichum setiferum 'Flabelli-pinnulum' — centre of frond.
c) Polystichum setiferum 'Grandidens', from *British Ferns and their Varieties* by C.T. Druery — centre of frond.

In past writings I have often said hard things about depauperate fern varieties, but some *do* merit garden room, so don't be too hasty. Keep them for a time to show their real worth — you may get a pleasant surprise!

BOOK REVIEW

GARDENING WITH NEW ZEALAND FERNS by Muriel E. Fisher, Collins, Auckland 1984. 119pp. 260 x 195mm. Photos. colour 46 plus 5 on jacket, black and white 69, Line drawings and maps of New Zealand. Price not shown.

Among the many gifts I received on my 80th birthday in 1985 was a gift of this book from my Seattle fern-friend, Judith Jones. She could not have chosen a nicer gift, for the ferns of New Zealand have long interested me, since my early ferning days when an uncle from Nelson in New Zealand "raved" about the local wealth of these plants which form a dominant part of that country's flora — the New Zealand national emblem is a fern frond. Muriel Fisher is obviously well under their spell — this is her second book about them; her first was *New Zealand Ferns in your Garden* (Collins 1976).

As the title proclaims, the book is not written for the botanist but for the fern lover and grower. The preliminary chapters describe ferns, their cultivation, growing from spores, growing in containers, landscaping with ferns, and enemies of ferns. A chapter on tree ferns for garden use and a fern planting guide are appended. It is, of course, written for the New Zealand grower, and for those fortunate enough to live in climates which approximate to that of New Zealand and are ideally suited for the growing of these plants.

The main part of the book (53 pages) is devoted to the description and cultivation of 85 species, based on their successful growing by the author under garden conditions. A large number will be very tantalising for British growers who must console themselves with growing them in the protected conditions of glasshouses or conservatories. Even if we do not grow them, there is the pleasure of "drooling" over them in the pages of the book. This must be the chief joy I obtain from possessing it and it will be treasured accordingly. Often removed from my bookshelves to browse over by the winter fire, it will waft me in thought to warmer climes among my favourite plants.

There is much more to ferns than just growing them — for the fern lover they have a big contribution to make in the written word and in the picture pages. Muriel Fisher's book with its descriptions and superb colour illustrations will be appreciated accordingly.

J.W. DYCE

WANTED

Two plants each of *Athyrium distentifolium, Athyrium flexile, Asplneium billotii, Dryopteris aemula* and *Dryopteris expansa;* for cash or possible exchange for other British ferns, in particular limestone rarities, John Mashiter, Elfrigg, Beachwood, Arnside, via Carnforth, Lancs.

NEW ZEALAND SPECIMEN BOOKS

MARTIN RICKARD, The Old Rectory, Leinthall Starkes, Ludlow, Shrops. SY8 2HP.

It seems that several members of our Society have the ambition of one day visiting New Zealand. The place has a magical attraction. It seems that few other temperate regions of the world can offer such a range of ferns, particularly two of the most popular kinds — the Tree and Filmy ferns.

My fascination with these islands has been fuelled over the last 15 or so years by various books on New Zealand ferns — especially the specimen books. These are books where pressed fronds are neatly labelled and bound in book form and issued commercially. The range of shape and even colour presented by the pressed fronds is much more real than photographs or paintings — and of course all specimens are natural size! To see fronds of *Hymenophyllum dilatatum* 18 inches long is quite a revelation to those of us used to *H. tunbrigense* at 2 inches! Curiously, while I have been collecting these books I have never come across any bibliographical listing of them. Below, therefore, I give details of those that I have bought or seen in private and public collections. There are sure to be many omissions and errors and I would therefore be most grateful for any additional information members may be able to pass on. I know, for instance, that there was at one time a New Zealand Fern Company (see Armstrong and Twomey below). More information on this would be most welcome.

It is not possible to list books by date as in no case was a date published. I guess however that most books date from the second half of the nineteenth century. In only two of my books are dates given in personal dedications. Therefore I list books alphabetically.

Armstrong, C.C. New Zealand Ferns mounted and botanically named by Mrs C.C. Armstrong. Dunedin, octavo. In this 'book' one sheet is folded into 8 sections each holding one specimen.

Armstrong, C.C. New Zealand Ferns mounted and botanically named by Mrs. C.C. Armstrong. Dunedin. As above, except this was produced in standard book form with 25 sheets.

Armstrong, C.C. and Twomey, J. The South Pacific Fern Album. New Zealand section, containing fronds of ferns collected throughout the islands by the New Zealand Fern Company. Arranged by Mrs C.C. Armstrong, edited by J. Twomey. pp.26, 9 with 20 sheets of 40 named natural specimens, folio 45 x 33cm. Melbourne. The only New Zealand specimen book I know of with text. Not seen.

Craig, E. New Zealand Ferns mounted by Eric Craig, Princes Street, Auckland. 27 x 32cm. Title details stamped onto reverse of front cover and on some sheets (see Fig.2b). 30 sheets each with a single specimen, most with a printed name label. Cover cloth with a fern motif blocked in gold.

Craig, E. New Zealand Ferns. As above, except cover is of carved wood, similar to, but smaller than, Fig.1a. 21 x 30cm. Title stamp also differs slightly, see Fig.2c. A personal dedication dated 1890 is written on the flyleaf.

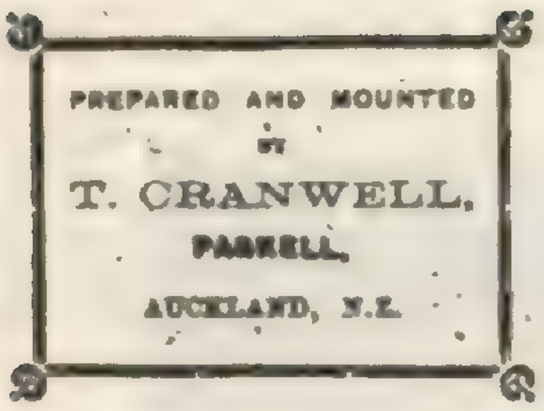
Craig, E. New Zealand Ferns and Fern Allies, collected, dried and mounted by Eric Craig, Princes Street, Auckland, New Zealand. 27 x 46cm. Title details given on a printed label (see Fig.2c). 52 sheets with 100 specimens usually identified by printed labels. First page a compilation of ferns fronds surrounding a black and white print of a painting of The Dripping Well near Lake Tarawera. The covers are of pale carved wood. New Zealand Ferns is picked out in black with the immediate background yellow. (See Fig.1a for centre detail). On the back outer edge of each sheet there is a thin backing strip of card to give protection and strength.

a)

5cm.

b)

Fig.1. Central designs from wooden front covers of New Zealand Fern specimen books
a) New Zealand Ferns and Allies collected dried and mounted by Eric Craig, 27 x 46cm.
b) A collection of ferns prepared and collected by T. Cranwell, 34 x 48cm.



a)

c)

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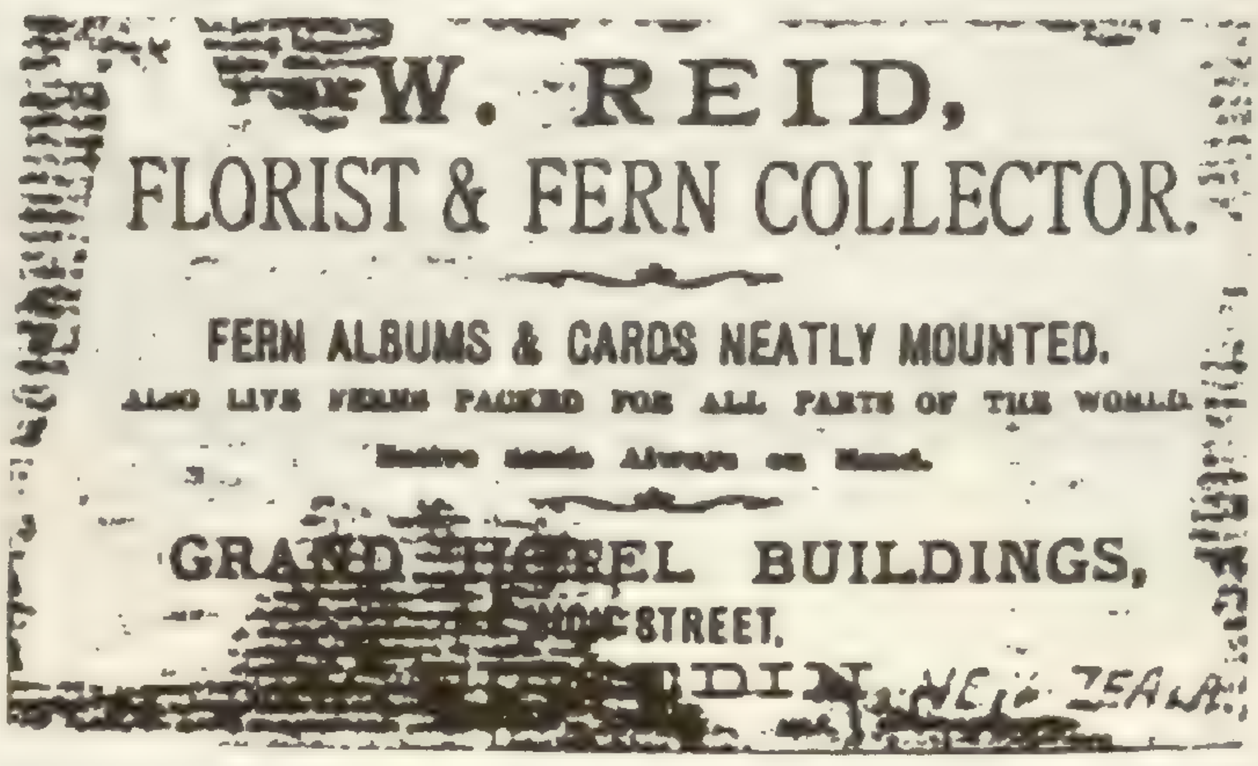


e)

f)

Fig. 2 Examples of printed labels or stamps from New Zealand Fern Specimen Books
a) T. Cranwell (label), b) E. Craig (stamp),
c) E. Craig (label), d) E. Craig (stamp),
e) W. Reid (label), f) W. Wildman (label)

Craig, E. New Zealand Ferns. Folio with wooden covers. Probably similar to the above, except there are two engravings before the title page and advertisements at the back. This book was published at 150/- (£7.50) probably about 1880. Not seen.

Craig, E. New Zealand Ferns and Fern Allies, dried and mounteld by Eric Craig, Princes Street, Auckland, New Zealand, 15 x 19.5cm. Title details given on printed label (similar to Fig.2c). This is a set of 2 volumes each comprising a single sheet unfolding to 58 x 111cm. On each sheet are slotted, in postcard album style, 24 cards 13.2 x 10.7cm.

The sheets are folded so that each section contains one card. Specimens are identified by printed labels or they are handwritten.

Cranwell, T. New Zealand Ferns prepared and collected by T. Cranwell, Parnell, Auckland, New Zealand. 21 x 28cm. Title details given on printed label (see Fig.2a). Carved wooden covers with 30 specimens arranged on to 30 sheets, each specimen identified by a printed label. A personal dedication on the flyleaf is dated 1875.

Cranwell, T. New Zealand Ferns. As above, only differing in detail, with 28 sheets.

Cranwell, T. (A Collection of New Zealand Ferns) prepared and collected by T. Cranwell, Parnell, Auckland, New Zealand. 34 x 48cm. Compiler details are given on printed label (see Fig.2a). This book has no title. 74 pages with 79 specimens identified by printed or hand written labels. Includes 2 mosses and 1 Fijian fern. Wooden marquetry covers (see Fig.1b. for central detail), the 'wooden' fern on the cover is probably *Adiantum cunninghami.* On the back of the outer edge of each sheet there is a broad backing strip of card to give protection and strength.

Jeffs, E. New Zealand Ferns. Wellington Horticultural Repository, Wellington, New Zealand. Twenty sheets with hand written labels. Not seen.

Reid, W. New Zealand Ferns. Grand Hotel Buildings, High Street, Dunedin. Title details given on printed label (see Fig.2e). 23 x 30cm. 42 specimens on 30 sheets most with hand written labels, but some specimens unnamed. The main title label (Fig.2e) states that neatly mounted fern cards were produced but I have never come across any.

Wildman, W. New Zealand Ferns collected in the Auckland Province. W. Wildman, Auckland. Title details given on a printed label inside the front cover (see Fig.2f). 31 x 25cm. 54 specimens on 36 sheets, see Fig.3 for a sample page. Labels printed with fern name added in freehand. Labels match front cover label in style, compare Fig.1f with Fig.3. Each page protected by a sheet of tissue paper.

Anon. New Zealand Ferns. There are quite a few amateur collections in existence but this album is of more than usual interest as it is identical to the one used by Wildman. It was presumably sold empty, perhaps with specimen labels, for amateurs to build up their own collections. My example has 93 specimens well mounted on 36 sheets.

In most of these books each specimen is arranged with pieces of fern frond and/or moss to make each sheet as attractive as possible. Only very rarely are specific localities given in any of the books I have seen.

That such a range of books has reached the U.K. is no doubt a reflection of world markets in Victorian times. Consignments were presumably also shipped to other countries, while a good selection must have remained in New Zealand itself. In most cases I have only seen one representative of each of the issues listed above, therefore it is virtually certain that other types exist — probably also by different compilers — perhaps some others are well known in New Zealand?

The ferns themselves are generally well preserved despite their age. The better produced books generally have 2 to 3 fronds of each species. Of approximately 180 pteridophytes

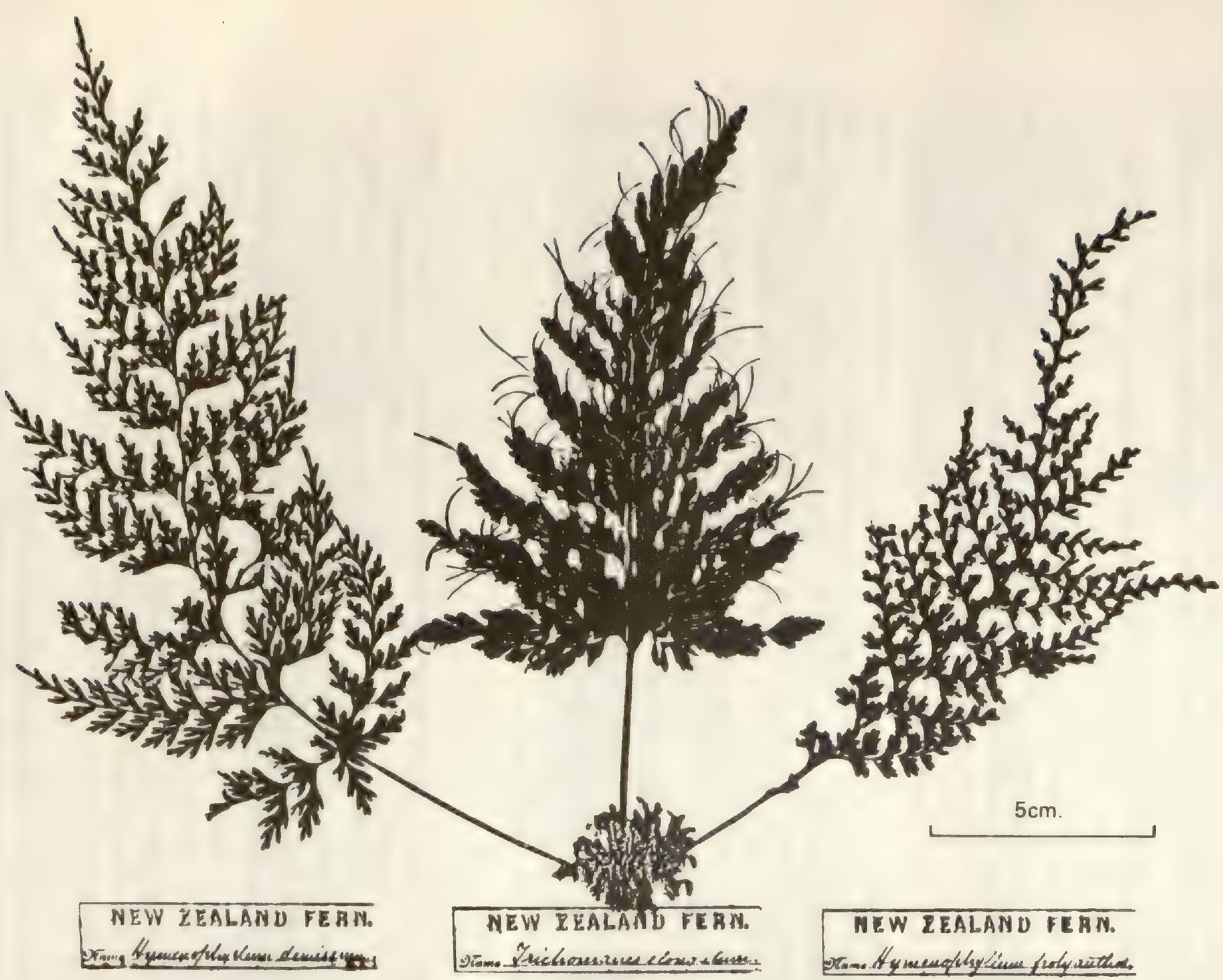


Fig.3 Sample page from New Zealand Ferns collected in Auckland Province by W. Wildman.
Original size 31 x 25cm.
Hymenophyllum demissum, Trichomanes elongatum, Hymenophyllum polyanthus

native to New Zealand, 128 have been included in one or other of the 8 books I have surveyed in detail. All the main genera are well covered with the exception of *Ophioglossum, Botrychium* and *Lycopodium*. In the case of the larger growing ferns, e.g. tree ferns, either small fronds or only pinnae are included.

For the record other more conventional New Zealand fern books are:

Anon, *Handbook to the Ferns of New Zealand*. c.1860.
Crookes, M.W. and Dobbie, H.B. *New Zealand Ferns*. Whitcombe and Tombs. 1963.
Dobbie, H.B. *New Zealand Ferns*. Whitcombe and Tombs. 1916, plus later editions.
Field, H.C. *The Ferns of New Zealand*. London. 1890.
Fisher, M.E. *Gardening with New Zealand Ferns*. Auckland. 1984.
Fisher, M.E. and Ward, L. *New Zealand Ferns in your Garden*. Auckland. 1976.
Harris, W.F. *A Manual of the Spores of New Zealand Pteridophyta*. Wellington. 1955.
Hamlin, B. *Native Ferns*. Wellington. 1963.
Heath, E. and Chinnock, R.J. *Ferns and Fern Allies of New Zealand*. Reed. 1974.
Leech, H.E.S. *Ferns which grow in New Zealand and the Adjacent Islands*. 1875.
Malloy, B. *Ferns in Peel Forest: a Field Guide*. Christchurch. 1983.
Stevenson, G. *A Book of Ferns*. Dunedin. 1954.
Thomson, G.M. *The Ferns and Fern Allies of New Zealand*. Dunedin. 1882.

News of any additions to this list would be most welcome.

BPS members who have visited New Zealand confirm the luxuriance of the ferns suggested so strongly by the production of all these books. I hope one day to see the proof of this myself!

SHORTER NOTE

Latin Varietal Fern Names

In recent times there has been argument in our Society, chiefly in botanical circles, that our present system of using Latin descriptive names for our fern varieties is wrong and does not conform to the international rules laid down for the naming of plants. I doubt if many, if indeed *any,* fern growers were consulted when the pundits laid the rules down, and I am a very strong supporter of our present methods. In my opinion, ferns should have been given separate consideration where the naming of garden variations is concerned, and not lumped with flowering and other plants in a "blanket" system.

Even in C.T. Druery's time the problem existed, and while browsing through his press cuttings recently I came across his reply, in one of the garden papers of the day in 1909, to a critic who cavilled at the name given to one of his new varieties.

> "... It is imperative to give fancy names to the innumerable varieties of florists' flowers etc. which present comparatively slight differences of form and colour; but it is a different thing altogether when we deal with what may be termed pedigree plants, like most of our fern varieties, where it is possible to divide them into sections and give them descriptive names by which their special character is indicated, without the need of referring in every case to a descriptive catalogue. Inside fern circles the names are no trouble at all; it is only outsiders who make a "bogey" of them. Those of us in the cult are the ones chiefly concerned, while those outside the cult who desire to take up the study can, by the aid of these names in print in recognised standard books, see how useful they are when properly arranged and classified."

J.W. DYCE

SHORTER NOTE

Woodsia ilvensis and Woodsia alpina

Christopher Potts kindly sent me these photographs of *Woodsia ilvensis* and *Woodsia alpina* in response to a request for material suitable for inclusion in the *Pteridologist. They are of a very high quality and should make the differences between these two closely* related species clear. As the plants were photographed in my garden I should perhaps add the conditions under which I grow them. They are side by side in a stone sink. Approximately the bottom two inches of the sink is filled with rounded pebbles about one inch in diameter, and the whole is topped up with Welsh mountain scree — a bag of which I collected from a roadside dump in central Wales.

So far after 3 years planted here both species seem to be thriving, although I do anticipate the lack of lime in this substrate may eventually cause the vigour of *Woodsia alpina* to decline. I water only with rain water.

The *W. ilvensis* was raised from spores collected on Moel yr Ogof in North Wales in 1972, the *W. alpina* from spores collected from the Chaine de Belle Donne in the French Alps in 1975. In Britain both *Woodsias* are Scheduled Species and protected by law. It is an offence, with heavy fines, for anyone without permission to collect these plants in the wild. Spore collection is also now extremely difficult as it is illegal to even pick fronds of Scheduled Species — spore is however usually available through the Society Spore Exchange.

MARTIN RICKARD

BOOK REVIEW

A GUIDE TO HARDY FERNS by Richard Rush. The British Pteriodological Society, Special Publication No. 1, 1984. 70pp. 168 x 241mm. Price: £4.50.

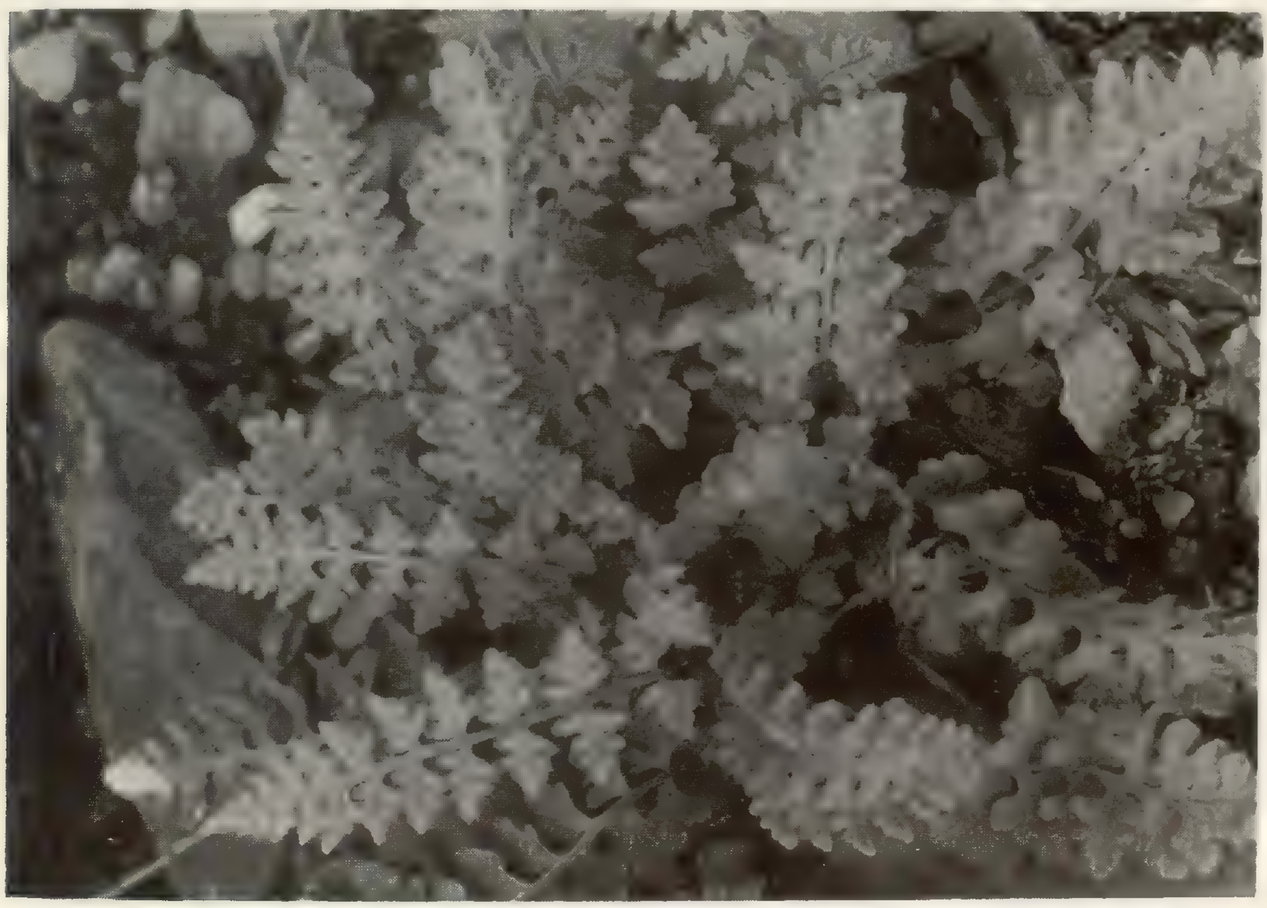
This excellent book, unfortunately, missed being reviewed in the 1985 *Pteridologist.* Written by one of our current Commitee members and published by the Society as Special Publication number 1, it has already been a great success. The original printing soon sold out, but it has been reprinted and copies are available through BPS Booksales.

Never before has such a comprehensive list of hardy fern species been put together in such a readily accessible form. 581 species are listed and many synonyms are cross-referenced. Where species are taxonomically difficult the author makes helpful comments, and the differences between some confusingly similar species are clarified (e.g. in the *Blechum capense* agg.). The author admits that even this list is far from exhaustive — some species were omitted as not being sufficiently distinct, while further species await trial, and yet many more await discovery!

My only criticism is the inconsistency of some of the entries, i.e. some genera have a descriptive introduction while others do not — a small point, but in a quick scan some genera might be missed. Overall the amount of information in this book, and the apparent rarity of typographical errors is a tribute to the author, the series editor Clive Jermy, and the printers, Metloc.

At £4.50 this book is a bargain and a valuable aid to any grower of hardy plants. Its appeal is sure to extend to both specialist and non-specialist fern growers.

M.H. RICKARD



Woodsia alpina (garden cultivated)
(photograph by Christopher Potts)

Woodsia ilvensis (garden cultivated)
(photograph by Christopher Potts)

Fig. 1. The habitat of *Lycopodium clavatum* at Braehead, northeast of Renfrew. In the background are the ship repair yards and houses of Yoker. The plant grows under the bushes and trees on the left. Photo: G. Steven.

Fig. 2. The authors are seen, observing *Lycopodium clavatum* growing on the steep bank in the Necropolis, very close to the historical heart of Glasgow. Photo: T.N. Tait.

RECORDS FOR "THE FLORA OF GLASGOW" IV
LOW ALTITUDE OCCURRENCES OF LYCOPODIUM CLAYATUM

G. STEVEN and J.H. DICKSON, Botany Department, University of Glasgow

In the summer of 1985 two discoveries of *L. clavatum* L. (Stag's Horn Clubmoss) were made within the Glasgow rectangle (Dickson 1984). The first, made by G.S., was in the vicinity of the now disused Braehead Power Station (national grid ref. NS 517679) about 50m from the bank of the Clyde at about 5m above sea level. Several clumps were found over an area of 100 sq.m. on flat ground shaded by *Betula pedula* Roth and *Salix cinerea* L., 3-5m high (see photograph 1). The *Lycopodium* was found to have branches up to 1.05m long and was fruiting freely.

The result of a 1 × 1m quadrat sample for this site (site 1) is shown in table 1.

Table 1.

	Cover Abundance (Domin Scale)	
Species	**Site 1**	**Site 2**
Lycopodium clavatum L.	4	5
Agrostis capillaris L.	2	2
Anthoxanthum odoratum L.	—	3
Betula seedlings	3	—
Carex ovalis Good.	—	3
Chamerion angustifolium (L.) J. Holub.	3	—
Deschampsia flexuosa (L.) Trin.	—	7
Galium saxatile L.	—	4
Hieracium spp.	3	5
Holcus lanatus L.	3	—
Luzula multiflora (Retz.) Lej.	2	2
Poa pratensis L.	2	—
Bryophytes	7	5
Lichens	—	2
Litter	6	—
Bare ground	—	3

Nearby but outside the quadrat for site 1 were *Anthoxanthum odoratum* L. and *Calluna vulgaris* (L.) Hull. The substrate consists of a 0-2.5cm mat of mor humus, pH 4.8 (glass electrode) over an unknown depth of industrial rubble made up of sand and gravel, pH 5.4.

The *Calluna* plants appear to be, at most, 10 years old as they are in the late pioneer stage of Watt's growth stages (Watt 1955). Trees in the locality were bored using an increment borer and found to be less than 12 years old. If, as suggested by Primark (1973), the age of *Lycopodium* plants can be determined by counting the number of constrictions on the stems then the sporophytes of the plants at Braehead are no more than 5 years old. It would appear, therefore, that the *Lycopodium* has developed in a shorter period than is usually thought necessary. Parihar (1965), for example, states that spores of *L. clavatum* germinate only after a period of 3-8 years and that the gametophyte of the species takes as many as 6-15 years to mature. Ollgaard (1985) cites a similar discovery of various *Lycopodium* species including *L. clavatum* on an area of gravel in Denmark where the evidence suggests that the gametophyte matured in no more than 3 years. He suggests that the permanently moist soil of the site helped increase the rate of development of the plants. It is also worth noting that *Lycopodium* can colonise bare mineral soils, at least in the gametophytic stage (Spessard 1922). *L. clavatum* has been recorded from other unusual sites such as coal bings (Corner 1967) and railway ballast (Braithwaite 1976).

The second discovery, made by J.H.D., was on a steep (about 45°) slope with an aspect of 320° (northwest) in the Necropolis at about 50m above sea level (national grid ref. NS 604655). The substrate consists of 25cm of sandy topsoil, pH 3.5, over sandstone rubble, pH 3.9. At least two individual plants were present again with fertile branches. The larger plant stretches 1.5m up and down the slope, 0.75m across. By counting the number of constrictions on the longest branches the sporophytes were estimated to be up to 11 years old. See Table 1 for the result of a 1.5 × 1m (longer axis downslope) quadrat at this site (site 2). Growing nearby but not shading the *Lycopodium* clumps were *Salix caprea* L., *Sorbus aucuparia* L. and *S. intermedia* (Ehrh.) Pers. (see photograph 2).

Other low altitude occurrences in west-central Scotland included the bank of the Paisley Canal which has long since disappeared (Hennedy 1891) and dunes at Stevenston, Ayrshire (Smith 1896) where *Lycopodiella inundata* (L.) Holub. was also recorded. *L. clavatum* has been found at no great altitude on both Bute and Cumbrae (Hennedy 1891) but in the typical heathy habitats as is the case for the recent records from the Renfrewshire Heights, the Gleniffer Braes (B.W. Ribbons pers. comm.) and the Kilpatrick Hills.

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PRIMARK, R.B. 1973. Growth patterns of five species of *Lycopodium. Am. Fern J.* 63: 3-7.
SMITH, J. 1896. *The Botany of Ayrshire.* Guthrie and Sons, Ardrossan.
SPESSARD, E.A. 1922. Prothallia of *Lycopodium* in America. II. *L. lucidulum* and *L. obscurum* var. *dendroideum. Bot. Gaz.* 74: 392-413.
WATT, A.S. 1955. Bracken versus heather, a study in plant sociology. *J. Ecol.* 43: 490-506.

BOOK REVIEW

FERNS IN PEEL FOREST : A FIELD GUIDE by Brian Malloy, 1983. pp.128; 145 x 205mm. Published by the Department of Lands & Survey, Christchurch, New Zealand. ISBN 0-477-06111-7. Price not quoted.

I have recently been given an excellent little book describing 58 species of fern and allied plants (*Tmesipteris* and *Lycopodium*) growing in Peel Forest, an area of beautiful wilderness, National Park some 150km SW of Christchurch, New Zealand.

Each species is attractively illustrated in silhouettes and line drawings in which the diagnostic features are neatly and effectively arrowed, and then listed in the legend at the page-foot. Two species, of *Blechnum* both yet to be formally named, are shown in colour, as is a map of the Park showing the location of some of the more uncommon ferns. This book is written for the informed layman and, as possibly 75% of the species are grown in British gardens, its value to our members is high. What is more it is an excellent example of what could be done in Britain and Europe.

I hope it will be possible to get a small stock of these books in BPS Booksales.

CLIVE JERMY

FERN GROWING IN EAST YORKSHIRE — THE COTTINGHAM CONNECTION

MRS. J.K. MARSTON, Culag, Green Lane, Nafferton, Driffield, East Yorks.

In the autumn of 1948 I was appointed at the Hull University College (as it then was) to develop a site in Cottingham as a botanic garden. It comprised about one acre of land, (an old market garden) and some three new greenhouses each 100 feet long.

The only plants to start off the garden were a small collection of poisonous and medicinal plants in use for research work, and a good representative collection of ferns which were given to the Botanic Garden by Dr B.T. Cromwell. The ferns had already had a chequered career as Dr. Cromwell commenced collecting ferns in the early 1920s, cultivating them at home both indoors and in a heated cedar greenhouse some 24 feet long. At the outbreak of the war Dr. Cromwell went to work at the research station at Auchincruive in Scotland and the glasshouse and the ferns went with him. On his return to Hull after the war back they all came. Dr. Cromwell was reader in Plant Biology and second in command under Professor R.D'O. Good. The latter was a botanist of the old school, a keen field worker and also a very keen horticulturist. His special interest was the family *Asclepiadaceae* and a range of these plants was collected from various parts of the world.

This was the situation in 1948 when I arrived on the scene. Dr. Cromwell donated his plants and greenhouse (which was bursting at the seams with plants) to start off what was to become a pretty representative fern collection for teaching purposes. Unfortunately he never kept any records of whence any specific plants came although he spoke of visiting Mr. Askew in Keswick and Mr. Kaye in Carnforth, and, of course, he collected a number of British species during the war years in Scotland. One particular plant which always interested him was *Asplenium marinum* collected as spores from plants on the Ardnamurchan peninsula. Years later I returned to the same site for more spores, our plants having deteriorated; the colony was still there but only 6-8 plants were left. The plants I now grow are from these spores.

It was the general rule of Professor Good that the garden should concentrate on straight species so very few frilled or crested ferns were grown. We tried to collect a representative type of both hardy and exotic ferns from each family to show students as diverse a range as possible. We had some interesting poypodiums, and in the early days had most types mentioned in Mr. Askew's list. *Polypodium australe* 'Omnilacerum', *P. vulgare agg* 'Cambricum' and *P. australe* 'Semilacerum' survive from those days propagated vegetatively, and Martin Rickard is almost certain that the 'Semilacerum' is variety 'Jubilee' dating back to the time of Queen Victoria. The *P. vulgare agg* 'Cambricum Barrowi' (if this is really the correct name) is a particularly handsome form.

For safety Dr. Cromwell and I always kept some plants of each type at home, but since his death most of his plants have been lost. Here I always keep one plant of most species in a cold greenhouse for extra safety. This corner of England is not an area noted for ease of fern growing.

Some thirty years ago Dr. Cromwell found a fine form of *Asplenium scolopendrium* 'Crispum nobile' growing in a cottage garden at Aram near Beverley and I still have plants of this form.

Many ferns were grown from spores after 1948, especially from the botanic gardens at Cambridge, Oxford, Glasgow and Edinburgh, and also from the Chelsea Physic Garden where there was an excellent collection of ferns and selaginellas in the time of Mr. W. MacKenzie. Fern spores were also grown from the BPS spore exchange and I have corresponded with Mr. J.W. Dyce since 1948, although unfortunately we have never met.

I have always grown a wide range of adiantums, hardy and warm house, and I am especially interested in them. In 1948 we had *Adiantum capillus-veneris, A. x. mairisii, A. hispidulum, A. formosum, A. venustum* and *A. pedatum* and its variety 'Miss Sharples'. I still have stock from all these species. In the warm glasshouses we had a wide range of *A. raddianum* varieties, most of which I still grow.. It is only the tropical forms I have been unable to keep going due to the cost of heating and lack of space. Many of these are now either reduced or lost at the Botanic Garden for the same reasons, or for general economies, or staff problems.

Little *Woodsia obtusa* has survived well as has *Woodwardia radicans* and *W. orientalis*. Amongst the *Dryopteris* we always used *D. filix-mas* for teaching purposes, and *D. filix-mas* 'Martindale' and 'Barnesii' still survive from 1948, but *D. filix-mas* 'Bollandiae' was lost some years ago. *D. affinis* 'Cristata the King' and *D. affinis* 'Grandiceps' are still growing well.

Therefore, you will realise that many of the plants in my present stock have been grown by me for a good number of years and I have always been careful to collect spores from the best plants of a species.

In the 1950s and 1960s we had a very large range of ferns in four heated greenhouses as well as a representative collection outdoors. The area of the Botanic Garden had grown by this time to some 16 acres. When I decided to take an early retirement in 1978 I was able to continue growing ferns at home and gradually increase my range of hardy species, and I always contend if one can grow ferns in the north east of England with often very dry cold winds in spring, one can (with suitable shelter from hedges and shrubs) grow ferns in most areas of the country.

SHORTER NOTE

Ophioglossum in dense woodland

The habitats in which *Ophioglossum vulgatum* generally grows are old meadowland, grassy roadside verges, damp waste places, and sand dune slacks. A site where it thrives on the western slopes of Great Haldon in Devon is unusual in being densely wooded. It was found there by N.T. three years ago covering an area of several square metres. Members of the BPS visited the place on 11 August 1985.

The wood (privately owned; grid reference 20/8785) faces south-west and is mainly ash (*Fraxinus excelsior*), which forms a dense upper canopy. In the middle canopy are *Corylus avellana* and *Crataegus monogyna*. The main species forming the ground cover are *Hedera helix, Mercurialis perennis, Oxalis acetosella, Potentilla sterilis,* and *Viola riviniana,* together with *Rubus fruticosus*. Less common constituents are *Geum urbanum, Primula vulgaris* and *Taraxacum officinale*. Below an upper layer of humus is a rather heavy loam, pH 6. The ground is generally rather damp; in fact a stream runs a few metres away.

Though somewhat obscured by the dense herbaceous ground cover, the fern competes successfully with it, and of about a dozen plants visible in 1985 half bore sporangia. The 1984 drought, exceptionally severe in Devon, caused the fronds to wilt but did not seem to have killed any of the plants.

N. TALLOWIN & T.D.V. SWINSCOW

TREE FERNS FOR ENGLISH CONDITIONS?

RAY BEST, 15 Orana Road, Kenthurst, 2154, New South Wales, Australia

I have received a suggestion from the Editor that some of the British members are keenly interested in hardy species of tree ferns that might grow satisfactorily in England.

Here in Kenthurst (called Kent Forest originally by a pioneer farmer from Kent in England) in a tree protected gully I have grown quite a few tree ferns over a period of some 16 years. Since in all my articles I prefer to describe only ferns I have grown, usually from spores, most of the information given comes from practical experience only. However, I must admit it is somewhat difficult to understand growing conditions in the Northern Hemisphere. May I recall from our own BPS *Fern Gazette,* Volume 11, Parts 2 & 3 in 1975, an excellent article with maps showing the world distribution of *Cyatheaceae* titled 'The biogeography of endemism in *Cyatheaceae'* by Tryon and Gastony. Obviously from this article we can see that the temperate zones of the Northern Hemisphere are devoid of naturally growing tree ferns; however, from my reading I realise that many tree ferns have been grown in England, introduced by the early botanists.

Here I shall list those species that I have grown successfully in a protected gully situation. Temperatures range from 30-35°C in mid-summer to 5°C in winter, with occasional severe frosts down to —5°C even in a lath house. In a roofed and unheated greenhouse two successive nights at 0°C have been recorded. This would cause some losses if no warmth were applied. Very few of the Australian species could survive freezing. Tree ferns do suffer in high and low temperatures. Burning of fiddleheads and exposed fronds can occur in summer while similar damage is caused by freezing weather in winter. This has never been sufficient to kill any of the species I grow here, so I shall attempt to indicate the hardier species that may possibly survive in England. Any damaged growth should be completely removed as it never recovers.

Australian authorities have advised that we must use for classification *Ferns and Fern Allies and Conifers of Australia* by H.T. Clifford & J. Constantine, 1980 (a local publication). Previous names are given in brackets after each entry. Age, in years, of the various species in my garden from spore sowing onwards is given together with the height of the trunk after this time. An * denotes the species more likely to be hardy in Britain; of these the New Zealand species are probably the better bet.

Family: *Cyatheaceae*. Smith.

*1. *Alsophila australis* R. Brown. Australia, age 16 years, height 1 metre.
(*Cyathea australis* (R.Br.) Domin.)
2. *Alsophila baileyana* Domin. Australia, age 5 years, height 0.1 metres.
(*Cyathea baileyana* (Domin.) Domin.)
*3. *Alsophila cunninghamii* (Hook) Tryon. Australia, age 16 years, height 3 metres.
(*Cyathea cunninghamii* Hooker)
4. *Alsophila marcescens* (N.A. Wakefield) Tryon. Australia, age 5 years, height 1 metre.
(*Cyathea marcescens* N.A. Wakefield)
5. *Alsophila rebeccae* F. Muell. Australia, age 2 years, small plant only, no caudex.
(*Cyathea rebeccae* (F. Muell) Domin.)
6. *Alsophila robertsiana* F. Muell. Australia, age 2 years, small plant only, no caudex.
(*Cyathea robertsiana* (F. Muell) Domin.)
*7. *Alsophila woolsiana* F. Muell. Australia, age 5 years, height 1 metre.
(*Cyathea woolsiana* (F. Muell) Domin.)
*8. *Cyathea brownii* Swartz: Hooker. Norfolk Island, age 16 years, height 6 metres.
*9. *Cyathea dealbata* Swartz (Rox) Morton. New Zealand, age 15 years, height 1 metre.
10. *Cyathea dealgardi* Stenb. Argentina, age 5 years, height 0.3 metres.

*11. *Cyathea medullaris* Swartz. New Zealand, age 5 years, height 0.3 metres.
*12. *Cyathea muelleri* Baker. New Guinea, age 10 years, height 2 metres.
13. *Cyathea robusta* (C. Moore) Holtt. Lord Howe Island, age 3 years, no caudex.
*14. *Sphaeropteris australis* (Presl.) Tryon. Australia, age 15 years, height 3 metres.
(*Cyathea leichhardtiana* (F. Muell) Copel.)
15. *Sphaeropteris celebica* (Blume) Tryon. Australia, age 2 years, small plant, no caudex.
(*Cyathea celebica* Blume)
16. *Sphaeropteris concinna* (Baker) Tryon. Australia, age 5 years, height 1 metre.
(*Cyathea felina* Roxb.) Morton)
*17. *Sphaeropteris cooperi* (F. Muell) Tryon. Australia, age 15 years, height 3 metres.
(*Cyathea cooperi* Hook: F. Muell: Domin.)

Possibly hardy species have been asterisked; other types, often softer, may however suit English conditions, and could be tried if desired. Unfortunately some non-hardy species are very beautiful — such as *Cyathea robusta* from Lord Howe Island — but they are worth attempting.

Detailed cultural descriptions are not necessary here, rather a general coverage of local growth conditions should indicate their requirements. *Cyathea* species grow much faster than *Dicksonia* species along our east coast. The gully where I grow all my outdoor types has been created over a period of some 16 years. *Eucalyptus* species (Australian gum trees) were first planted to provide overhead cover — *Eucalyptus salignus* (Sydney Blue Gum), *E. robusta, Acasia elata,* etc. These are all evergreen species that create both winter and summer protection. Those leaves that do fall tend to rot down to a somewhat acid soil; however the leaves of deciduous trees are very useful in providing an excellent mulch for all young ferns. Obviously some protection either by evergreen trees, or an artificial construction, would be necessary during an English winter; summer should look after itself. Before my trees were established I constructed a tree guard-like structure over which a heavy plastic cover could be placed both in summer (excess heat) and winter (excess cold). Once the trees were established no further protection was necessary.

Family: *Cyatheaceae,* sub-family *Dicksoniaceae.*

*18. *Dicksonia antartica* Labill. Australia, Tasmania, age 16 years, height 1.52 metres.
*19. *Dicksonia fibrosa* Colenso. New Zealand, age 10 years, height 1 metre.
*20. *Dicksonia squarrosa* Swartz. New Zealand, age 14 years, height 1.52 metres.
21. *Dicksonia youngiae* C. Moore. Queensland, and New South Wales, age 14 years, height 2 metres.

Of the four *Dicksonia* species mentioned *Dicksonia youngiae* may be the most difficult as it is a subtropical species; all the others seem to cope well with our winter conditions if given protection. Basically they are much slower growing than the *Cyathea* species, both in spore development and in general growth. As the seasons are reversed with spore transfer, germination would possibly take twice as long. In my experience of spore culture the long lived slow growing ferns require longer periods for spore raising. Time and patience can produce many surprises.

Family: *Osmundaceae.*

*22. *Todea barbara* (L) T. Moore. Australia, age 16 years, no caudex, fronds 1 metre.

Slow to develop from spores and very slow growing; I have seen one mature plant in the Blue Mountains area of New South Wales with a caudex about 1 metre in diameter and almost 2 metres high. It was possibly 200 years old. Once established in the ground it is a very hardy and tenacious fern.

VARIATION IN POLYSTICHUM PROLIFERUM

ROD HILL, 41 Kareela Road, Franksten, Victoria 3199, Australia

In 1890, Lowe described over 360 varieties of the British fern, *Polystichum setiferum*. Even after discarding insignificant forms, Druery, in 1902, still recognised 173 varieties.

That so many variations in the one species are recorded from such a small region seems rather amazing to me, and it would be reasonable to assume that some natural variation is to be expected in other species, including our own native Australian ferns. With this in mind, I set about making a study of our own shield fern, *Polystichum proliferum*, whenever I encountered it in the wild.

Briefly, *P. proliferum* is a large, tufted fern with numerous leathery bipinnate fronds, commonly about 80cm long, forming a symmetrical rosette about an erect scaly crown. Each frond normally produces 2 or 3 bulbils near the tip. The fern is one of Victoria's most common and hardy, being found in moist forest and along creek banks from sea level to sub-alpine regions, often forming quite extensive stands. It has been quite common in cultivation in Victoria for many years, long before the current upsurge of interest in ferns, and tends to be somewhat overlooked by present-day fern enthusiasts.

However, *P.proliferum* has proven to be a most interesting subject for study, showing considerable variation in shape and division of the frond, as the ten illustrated pinnae show. While growing conditions will undoubtedly influence the appearance of a fern, it seems certain that the differences illustrated are due to more than environmental factors.

Firstly, several groups of pinnae were collected from ferns growing in very close proximity. For example, pinnae numbers 1 and 2 were obtained from plants growing along a creek bank in the Grampians, a rugged mountain range just over 200km west of Melbourne (and were growing in the company of more 'normal' looking forms). Numbers 3, 4 and 5 are from Mt. Cole State Forest (about 160km west of Melbourne) and again, while each form was growing in almost pure stands, the patches were abutting each other. I have propagated a number of these forms from bulbils and, while as yet they are still only small plants (to about 10cm), already the differences between some of them are quite apparent.

In addition, pinnae numbered 7 to 10 are taken from mature plants already established in my own garden (under virtually the same growing conditions as each other). Number 8 originated in the Dividing Range east of Melbourne and is fairly typical of many plants found in cultivation and in the wild throughout Victoria. Numbers 7 and 9 are from isolated occurrences, again to the east of Melbourne, and number 10 is from the coastal ranges near Apollo Bay (160km south-west of Melbourne). These four plants have obviously maintained their individuality in cultivation.

Pinna number 6 was collected from one of a population of *P. proliferum* growing at Mt. Wilson in the Blue Mountains, west of Sydney.

While my experience with these forms of *P. proliferum* in cultivation is still rather limited, it is already certain that some of them at least do retain their distinctive characteristics and are very worthy of our attention. Although a rather long term project, it would also be interesting to investigate the propagation of these forms from spore in the hope of producing even more diverse varieties. Who knows, perhaps in time *P. proliferum* may even rival *P. setiferum* with its 173 varieties.

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Polystichum proliferum – range of form of pinnae

MORE EXPERIMENTS WITH FERN VARIETIES

NICK HARDS, Holme Cottage, Kyme Road, Heckington Fen, Sleaford, Lincs. NG34 9NA

I joined the Society at the meeting in the Cotswolds in 1978, and my first day as a member was memorable for two reasons. In the morning I found *Polystichum setiferum* 'Divisilobum' growing wild — it is a particularly good variety and growing well now in my garden — and in the afternoon we went to see Philip Coke's garden. I was most impressed by the numerous species and varieties he grew, and filled with enthusiasm. I am pleased that he has now written about his method of growing new varieties (Coke, 1985), and I hope other members will be encouraged to experiment.

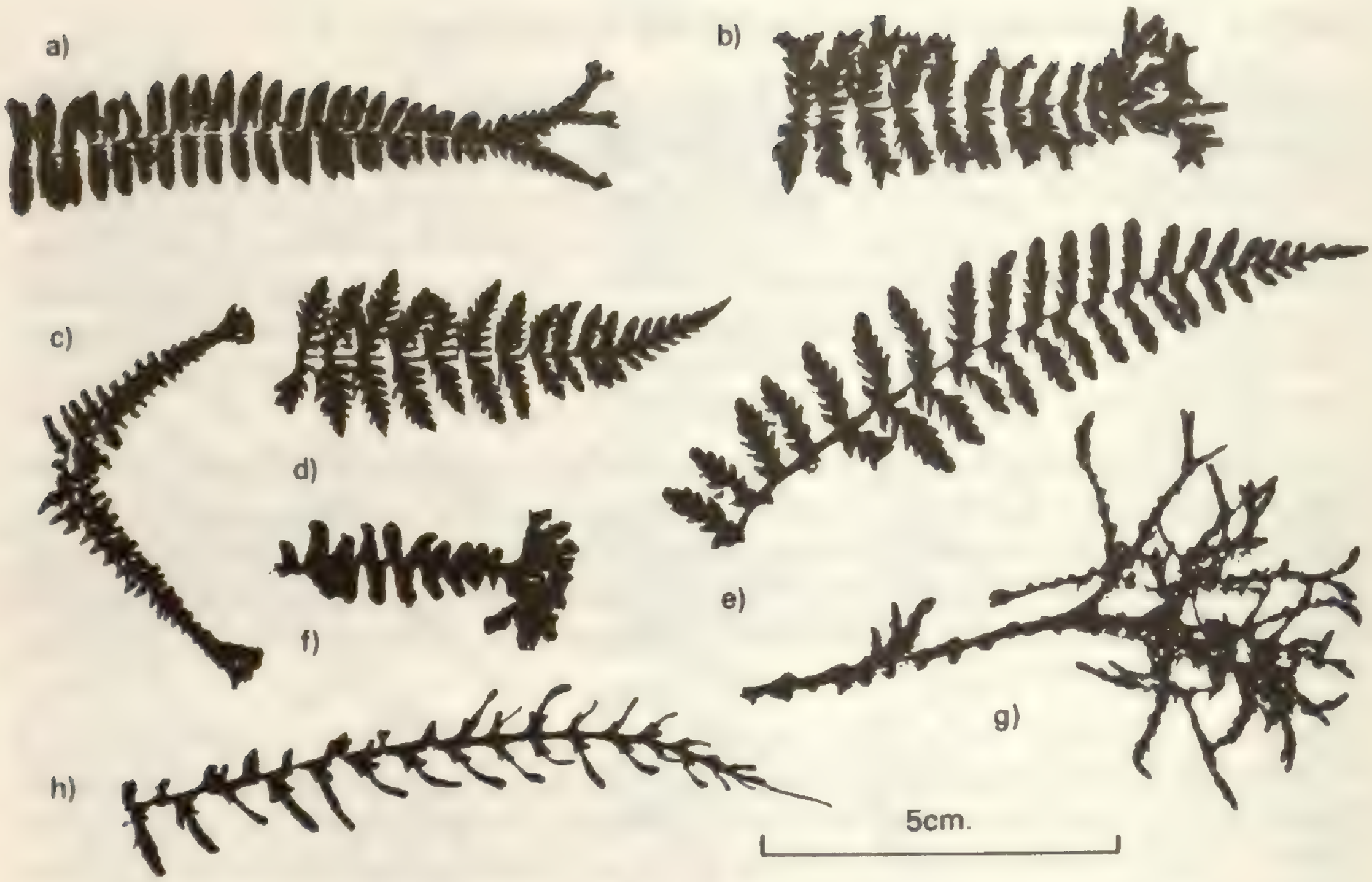
My first experiments were made a couple of years later, with mixed sowings of varieties of *Dryopteris filix-mas* and of *Athyrium filix-femina,* and when I moved house in 1981 I was able to take with me two large boxes of young plants. Unfortunately that was the start of a very hard winter and the Lady Ferns did not appreciate being buried under thick snow, then frozen solid for a month after a temporary thaw, then again buried by snow. However, several plants survived.

The Male fern varieties which I mixed were 'Linearis', 'Linearis polydactyla' and 'Martindale' from the Spore Exchange, and spores from a handsome robust crested Male Fern I found growing wild near Austwick. All these characters were reproduced in the progeny and many duplicates went to good homes inside and outside the Society (some were even sold at church fetes!). I think somewhere along the line spores of a lovely dwarf variety, 'Crispa cristata', must have crept in, and these were responsible for three of the best 'mixtures'. Two dwarf plants have crisped and truncated pinnules and the pinnae terminate in elegant little crests. I suspect these have 'Linearis' (Fig. h) or 'Linearis polydactyla' (Fig. g) in their parentage. The third is dwarf, narrow, heavily crested and crisped, and is my favourite — possibly a cross with the Austwick plant (Fig.f).

There is also a very fine full sized crested Male Fern intermediate between "Linearis polydactyla' and the Austwick plant, and a 'Linearis polydactyla' (Fig. g) with very prolific cresting. Rather surprisingly, as well as some very ordinary Male Ferns, I have one plant from the sowing which looks very much like the variety 'Decomposita' (Fig. e). Although I did not know it at the time, I was already growing 'Decomposita' from spores collected the previous year. I saw a very handsome fern in a garden, without knowing what it was, and collected the spores. I doubt however if any spores could have lingered in my house for a year and possibly this was a partial reversion to the type from 'Linearis'.

The Lady Fern varieties which I mixed were 'Digitata' (Fig. a), 'Grandiceps' and 'Percristata' (Fig. b) from the Spore Exchange, plus spores from 'Angusto-cruciata'. The last is an ugly name for a beautiful plant, which I found in the garden of a Victorian house in Manchester. I thought several junior plants were going to be percristate, but they succumbed to the weather. I have however several good plants which are still thriving plus a couple which are extremely ugly. One is cruciate at the top but cristate lower down, and strongly resembles plants which I have seen other members of the society trying to give away! There are two good normal 'Grandiceps' and another which is darker green and depauperate. Fortunately I have one good 'Cruciata' (Fig. c) — Ray Smith has an offset and I have sent spores to the Spore Exchange this year. The surprise is an incised form (fig. d) which gets better every year. It has some bifid tips but is not crested. Hopefully it may be the parent of something even better.

I have to admit that my early successes are only part of the story. I grew a magnificent pot of moss when I tried a mixture of *Polystichum setiferum* varieties. I have at the moment twenty clay pots in the greenhouse from last year's efforts — not only are there no ferns, most of them were shunned by mosses as well! On the other hand, I have a hundred or so "scollies" from another mixed sowing which have been pricked out and are now begging



a) Athyrium filix-femina 'Digitata'
b) A.f. 'Percristata'
c) A.f. 'Cruciata'
d) A.f. 'Incisa'
e) *Dryopteris filix-mas* 'Decomposita'
f) D.f. 'Crispa-cristata'
g) D.f. 'Linearis polydactyla'
h) D.f. 'Linearis'

me to pot them up singly. The trouble is, of course, I do not know which, if any, are any good.

It is extremely satisfying to try and raise your own varieties. There may be better plants in other collections, but even the monstrosities have a certain appeal when you raise them yourself. You do not need to be an expert — just lucky. (I did not know what some of these varieties looked like when I sent for the spores). Best of all, it is a continuing story — some of my more interesting plants are now producing spores which may lead to more surprises. One good idea might be to mix dwarf and large varieties, judging by my experience with Male Ferns. And bear in mind that, if you keep a record of what you mix, even if your best plants are later lost the cross breeding can be repeated.

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NEW FERN VARIETIES — WILD AND CULTIVATED

J.W. DYCE, 46 Sedley Rise, Loughton, Essex IG10 1LT

This year I have very little to say about new variety finds in the wild. Even Martin Rickard can contribute very little — two finds of *Polypodium australe* 'Semilacerum', as well as a minor variation in *Blechnum,* and a narrow form of *Oreopteris limbosperma.*

Last summer Martin and I explored some Monmouthshire gardens which had belonged to fern men in the last century. Several very good varieties of *Polystichum setiferum* were found, among them many divisilobes which, we are sure, must have had names. However, so many divisilobe variations look so much alike that it would be impossible now to link them to any particular names.

Our member Ron King last summer sent to me for naming a frond from a very fine *Polystichum setiferum* "Divisilobum' from a local nursery near his home in Kent. It is a very large-growing deltoid form and a perfectly divided classic example of the variety, almost approaching 'Plumoso-divisilobum'. I am told the plant came to the nursery from Germany and it would be interesting to know more about its history.

Once again Ray Smith has been finding things. He sent me a 30-inch frond from a very narrow cruciate form of *P. setiferum.* It is rather irregular with a 'Grandidens' type of pinnule and is bulbiferous. Ray grew the plant from a bulbil he collected some years ago from a Warwickshire garden and it is now a very impressive plant. He also sent me a photocopy of a frond from an *Asplenium adiantum-nigrum* he found in Orkney last summer. This is a ramose form and one of 5 fronds growing from a fissure in serpentine rock. While not an exciting garden plant, it was an interesting find.

I made a good "find" in my garden last summer — an *Athyrium filix-femina* which I had collected several years ago as a tiny sporeling with a 'Grandidens' look about it. Overlooked and forgotten, it had quietly flourished and was a most pleasant surprise when finally spotted last year. It has become a very good example of its kind and features among the illustrations to my article on 'Grandidens' in this issue. Well worth naming, I am calling it 'Spinosissimum' (most spiny).

Many good finds have come from the spore-pots of our dedicated breeders in the past, and still continue to come. Foremost in this field are Ray and Rita Coughlin who, in recent years, have added greatly to the fern riches for our gardens. I won't say more about them here, as I understand they are contributing a paper for this issue and I might, inadvertently, "tread on their toes". I am pleased to see that Jean Marston who has a fern nursery near Driffield in East Yorkshire, is becoming active in the breeding field. She has sent me fronds from a small deltoid *Athyrium* with very imbricate and densely divided pinnules and crested pinnae. It is rather reminiscent of a dense plumoso-divisilobe in *P. setiferum.* It is still a young plant but promises to become something really good when fully grown.

For the past several years Judith Jones from Seattle in the USA has been producing first-rate new varieties from our British ferns, in which she specialises, in her small nursery. Now, she has gone into partnership with another nurseryman, Torben Barfod, and good things are beginning to come faster. In this issue she describes how they have made a new break in breeding a crested variety of *Adiantum pedatum* which they are calling 'Tassellatum'.

Judith always sends me fronds from her successes, for me to assess and discuss suitable names. A rather impressive collection arrived last year. They included two *P. setiferum* varieties, one with very large completely round pinnules, very much overlapping with a heavily-crested apex and deltoid in shape. The other has similarly shaped pinnules and is even more imbricate, but is long and narrow in shape; in addition it is bulbiferous.

But in the package were still better things in a selection of her new Lady Ferns. One is a dwarf about 4 inches high and so densely congested that the pressed frond builds up to a thickness of almost a quarter of an inch. 'Uncoglomeratum' and 'Caput Medusae' are the names that leap instantly into the mind when this frond is looked at. The large heavy division at the apex is a contorted mass of snake-like growth and the short pinnae are developed in a similar manner — a most remarkable little fern of which I hope we shall hear more.

A selection of fronds from a sowing of what Judith thinks is *A.f-f.* 'Regale' which she received from the Coughlins, completed the package, and contained more exciting surprises. Some are slightly depauperate and qualify well for the 'Grandidens' section. The best one is an exquisite gem, beautifully lanceolate and perfectly regular in all its parts. The pinnules are very narrow with hair-like side divisions and very neat minute bristly crests. The pinnae have heavily-divided but very graceful spiny crests and the apical crest branches out into narrow bristly divisions. I have suggested 'Setigero-multiceps Jones' as a suitable name. Another frond has a similar build but is very congested, with the cresting much enlarged and dominating the frond. A suitable name for this would be 'Setigero-glomeratum'. The other fronds sent may not be quite so good as the two mentioned here, but all of them are from superior plants well meriting propagation and distribution under a section name.

I look forward to hearing further good news about all these ferns in the coming years — all of them can make valuable additions to the fern border.

SHORTER NOTE

Rare fern in a Devonshire valley

Over several years both of us have unsuccessfully devoted some time to trying to track down the Forked Spleenwort (*Asplenium septentrionale*) in Devon. According to the *Flora of Devon* edited by W. Keble Martin and G.T. Fraser published in 1939, it was first reported in 1877 by the Rev. H. Roberts. That year it was recorded from two parishes, Christow and Hennock, but Keble Martin's comment attached to the Hennock record, 'doubtless referring to the same station', suggests he believed the plants to be confined to Christow. The most recent record is by Keble Martin himself, who recorded it from Christow in 1938. Since then there appears to have been no recorded sighting of this fern in Devon.

During the South West Region BPS meeting last year (see *BPS Bulletin,* 1985, p.45.) a potentially suitable rocky habitat was seen in the distance although there was unfortunately not enough time to visit it. This spring (1986) therefore both of us returned to the area, climbing through brambles and thick gorse before finally reaching the new target area. For the most part the rocks were disappointingly bare of ferns although as we worked nearer their base we were delighted to come across many fine plants of *Asplenium billotii* together with one plant of *A. adiantum-nigrum.* Thoughts of *Asplenium septentrionale* had almost faded when at long last two fine plants were found. Each had perhaps 100 fronds 2-3 inches long. Renewed search failed to reveal more plants. There are however other rocks in the area, and other valleys remain to be explored, so hopefully more plants of *A. septentrionale* await discovery.

This colony is almost certainly the one known to Keble Martin, but as it seems to be sadly depleted from 'the considerable quantity' reported by the Rev. Roberts in 1877, some of which is now in BM, details of the precise locality are being treated as confidential.

M.H. RICKARD and T.D.V. SWINSCOW

SOME OBSERVATIONS ON FERNS FROM THE ISLES OF SCILLY

B.M. SPOONER, Royal Botanic Gardens, Kew; and
J.P. BOWDREY, 53a Finchley Road, Westcliff-on-Sea, Essex

A holiday in the Isles of Scilly from 23 June — 6 July 1984 provided an opportunity to make some observations of the flora of the islands. Amongst these were records of fifteen species of ferns, of which the following seem worth placing on record. Records of ferns from the islands were summarised by Lousley (1971, 1975), who accepted 27 species as native or naturalised in the islands, and additional records to 1980 were given in Margetts & David (1981). We have not traced any subsequent reports.

A surprising number of native fern species occur in the Scillies in view of the small land area, little more than 6 square miles in total. This restricts the available habitats, adversely affecting the diversity of flowering plants, despite the extreme south-westerly position of the islands and their very mild climate. There is no longer any natural woodland in the islands and tree cover occurs only around the gardens on Tresco and in a few limited areas on St. Mary's. As a result, the whole area is subject to high winds and salt spray. Lousley (1971) discusses these effects and reviews the available habitats. However, whilst some species, notably *Pteridium aquilinum* (L.) Kuhn and *Asplenium marinum* L., are widespread and common in suitable habitats on all the larger islands, many others, such as some of the wall-inhabiting species of *Asplenium* and allied genera, are rare. Several alien species have also become established, though none are common.

Though the 15 species we observed amount to little more than half the total known from the islands, this is, perhaps, not so bad in view of the fact that 2 of the species included by Lousley (*Dryopteris aemula* (Ait.) Kuntze and *Polystichum aculeatum* (L.) Roth) have not been recorded this century and 11 others are very rare. In addition, our visit was too late to record any of the 3 species of *Ophioglossum*. We were regrettably unsuccessful in locating any plants of *Botrychium lunaria* (L.) Swartz, despite an intensive search in the vicinity of the Telegraph near Bar Point, its only known station in Scilly. Considerable disturbance still occurs here in addition to that observed by Lousley (1971). We were also unable to locate any *Ceterach officinarum* DC, recorded by Lousley from walls at Higher Town, St. Martins, or *Asplenium ruta-muraria* L. The latter was reported in the islands in the mid-19th century (see Lousley, 1971), but was not subsequently confirmed until 1979 when it was reported from a wall on St. Martins (Margetts & David, 1981). This may be one of the house walls which currently support extensive colonies of *Polypodium interjectum* Shivas, *Asplenium adiantum-nigrum* L., *A. marinum* and *A. trichomanes* L. The latter remains abundant here, and we counted over 30 plants on one wall alone, but it is virtually absent elsewhere in the islands. The reason for this is uncertain, though the resistant granite blocks from which most of the island walls are built may render it difficult for this species to become established. One of its previous stations was the old mill on the Garrison, St. Mary's, although this we were unable to locate. There appear now to be few suitable habitats for this species on the Garrison and, though the sheltered inner wall of the old well seemed a likely candidate, this supports only *Asplenium marinum*. This is nevertheless a very well-developed colony, with fronds up to about 70cm long, the most luxuriant growth we encountered anywhere in the islands.

Amongst the alien ferns, we were fortunate to discover a strong colony of *Cyrtomium falcatum* (L.f.) C. Presl in a roadside hedge near Rose Hill, St. Mary's, growing with *Asplenium scolopendrium* L. and *Heracleum sphondylium* L. in deep shade under elms. This species, according to Lousley, was first discovered in Scilly in 1956, under boulders on shore near Porth Minnick. We searched at this locality, but were unable to find any trace of it although, according to Mrs. R.E. Parlow (pers. comm.), it has recently been reported from this site. It has since also been reported in grazed rough pasture near Porth Hellick (Corkhill, 1977) and was recorded 'in two places on St. Mary's' by Margetts &

David (1981). The station reported here appears not to have been previously published.

We found a single plant of *Adiantum capillus-veneris* L. growing in the well in the Abbey Gardens, Tresco. This is extremely rare in the Scillies according to Lousley, though now abundant around the Gardens' greenhouses according to Mrs. Parlow (pers. comm.). Another alien, *Blechnum cordatum* (Deav.) Hieron (*B. chilense* in recent literature), has long been known from ditches near Salakee and remains well-established there. The native member of the genus, *B. spicant* (L.) Roth, is extremely rare on Scilly, and was considered by Lousley to be probably extinct. It was reported in the 19th century from near Giant Castle, Salakee Downs, but has not been rediscovered hitherto on St. Mary's. However, 3 plants were reported in 1975 from Lower Town, St. Martins (Margetts & David, 1981), and the species is known otherwise only from the Tresco gardens, where it is presumably under cultivation. We are, therefore, very pleased to report here a good colony discovered on St. Mary's growing under *Pteridium, Lonicera* and *Luzula* sp. on the southern edge of a sunken track leading down to a launching point on the shore below Toll Hill (SV 926121). One large fertile plant and several small plants occur here.

Acknowledgements:
We extend our thanks to Mr P.J. Edwards for general advice and discussion, and to Mrs. R.E. Parslow, BSBI recorder for the Isles of Scilly, for additional records and comments on the present status of several species.

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SHORTER NOTE

Irish Fern Stamps

On 20 March this year the Post Office of Ireland (Eire) issued a set of stamps devoted to Irish ferns in their series illustrating the Fauna and Flora of Ireland. The three values are: 24p — Hart's-tongue Fern, 28p — Rusty-back Fern and 46p — Killarney Fern. It is interesting to note that, to my knowledge, this is only the second fern stamp issue made by any country. The first was the issue by Guernsey in 1975 of four stamps depicting ferns to be found on that Island. We were closely associated with this for the reason that one of the ferns chosen was *Asplenium x sarniense,* a new fern hybrid for Guernsey and Britain, found by our member Dr Anne Sleep during a BPS field meeting on the Island in 1971. I still have a small supply of first day of issue covers, with the four stamps affixed, for sale in BPS Booksales. I shall NOT be stocking the Irish stamps.

J.W. DYCE

TERANIA CREEK RAIN FOREST

RAY BEST, 15 Orana Road, Kenthurst, 2154, New South Wales, Australia

Recently with the assistance of a keen fern friend I had the opportunity to visit this astounding forest which will hopefully be protected for future generations.

Approaching the area it is obvious that the original area was much larger; the only portion being left is the almost inaccessible mountain terrain. Surrounding farms give a clear indication of the rich soil and the readily available pure water supply. We find lush pecan nut plantations, banana, pineapple and paw-paw stands. After having removed the rain forest, obviously the farmers realised that some protection from the wind was necessary to grow their crops. So most have planted wind breaks of camphor laurel trees (*Cinamomum camphora*). These imports with their beautiful light green dense foliage undoubtedly provide an excellent wind protection.

However they appear to be spreading rapidly to footpaths, roads, etc., and in some cases entering even the very forest itself; serving to indicate just how difficult it is to protect such a heritage. On entering the forest a number of attempts at replanting have been made by the Forestry Commission; boards indicate the tree types planted and the time of sowing; here considerable confusion also exists, as seedlings of many of the existing trees have penetrated these new areas along with weeds and shrubs; unfortunately the result is far from effective.

Upon entering the undisturbed forest area itself, massive trees festooned with *Platycerium* (stags and elks) and *Asplenium* (birds nest ferns) suspended hundreds of feet above the ground, create a cathedral-like atmosphere. Hanging mosses illuminated with the few shafts of sunlight that penetrate occasionally add to the effect. Within thirty square feet of ground cover here, we find practically every species of our native ferns flourishing. No wonder the Original Australians developed such a deep respect and attachment to their land and attempted to the best of their knowledge to preserve it.

Unfortunately our time was limited, and it would be difficult and confusing to include a list of all the ferns, trees, palms, etc., that flourish in this area. However we did come across a few unusual ferns: one appeared to be a species of *Diplazium*; another a tree fern type that resembled *Cyathea cooperii* but with a much narrower trunk, with a crown of closely clustered fronds that left a delicately patterned caudex unlike any other species seen by us; also a large leaved *Gleichenia microphylla* and an unusual *Sticherous* species.

Although we may make attempts to recreate rain forest and grow ferns in glasshouses and artificial environments all our efforts are fitful when compared to undisturbed nature. If in our efforts we attempt to propagate some of the species that are on their way to extinction and learn how to keep them alive, we can assist others to gain an understanding of the magnificence of undisturbed nature, and create a desire to preserve our few remaining masterpieces.

BOOK REVIEW

MAIDENHAIR FERNS IN CULTIVATION by Christopher J Goudey, Lothian Publishing Company Pty Ltd., Melbourne, Australia, 1985. 336pp, over 430 colour photographs and world distribution map, 248 x 183mm. Australian dollars 59.95.

This monumental and comprehensive work by Chris Goodey is going to be a "bible" for those interested in, and the growers of the beautiful Maidenhair Ferns. In Britain they are very much loved and admired but, with a few exceptions, have to be grown in protected conditions, in greenhouses and as house plants. Many of them are so fine and delicate that even in warm countries they have to be given protection, and I recall with great pleasure visits I made to indoor collections in Florida and in California, which were breath-taking in their beauty. There are approximately 200 species worldwide, but the cultivars and hybrids of the popular cultivated species must boost the numbers to thousands.

Chris Goodey is an enthusiast and this book is the result of many years' work and research worldwide. A very large number of species and cultivars are covered and it must have been a mammoth task getting them all sorted out and correctly named. A few of us in this country contributed a little help. Not only is the author an expert grower of Maidenhair Ferns, he is an equally expert photographer, as the colour photographs will testify — all of them, with a few exceptions, are his work. They are of individual fronds and the standard is such that there should be no identification difficulties.

The preliminary chapters of the book deal with Methods of cultivation; Fern hybridization; Soil, water and light; Insect pests and diseases; Cultivars and variants; Cultivation tips; and Starting a collection. There is also a very good world distribution map.

The main part deals with about 170 species and cultivars in alphabetical order, with accurate texts covering botanical descriptions, natural habitats, growing conditions and propagation methods, each accompanied by a superb colour photograph. Many people in Britain who have no facilities for growing these ferns apart from the odd house plant will buy the book just for the photographs. I must include myself among them, for all my energies are devoted to growing British hardy fern varieties, but my copy has already been well used. It is beautifully finished and the presentation is excellent. I expect the critical reader will find something to cavil at, but with no expert knowledge of Maidenhair Ferns, only a great admiration for them, I would hesitate to voice any criticism of such a masterly work. I am sure the great majority of readers will agree with me.

I stock this book in BPS Booksales, selling it at a reduced price of £25.00 (inclusive of postage £27.00 — the book is a heavy one!).

J.W. DYCE

BOOK REVIEW

SUPPLEMENT TO THE FLORA OF GLOUCESTERSHIRE Edited by S C Holland. 196pp., 8 col.pl. Grenfell Publications, Bristol, 1986. Price: £11.50.

This little book is excellently produced, easy to consult and makes interesting reading even if you have not got the original *Flora of Gloucestershire* (H.J. Riddelsdell, G.W. Hedley & W.R. Price, 1948). Two interesting fern records (*Lycopodium clavatum, Equisetum sylvaticum*) are illustrated by line drawings. There are still things to be found in Gloucestershire (or refound) e.g. *Asplenium billotii, Dryopteris aemula* and *Hymenophyllum tunbrigense.*

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PTERIDOLOGIST

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THE BRITISH PTERIDOLOGICAL SOCIETY

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The BRITISH PTERIDOLOGICAL SOCIETY was founded in 1891 and today continues as a focus for fern enthusiasts. It provides a wide range of information about ferns through the medium of its publications and available literature. It also organises formal talks, informal discussions, field meetings, garden visits, plant exchanges and a spore exchange scheme. The Society has a wide membership which includes gardeners, nurserymen and botanists, both amateur and professional. The Society's journals, the *Fern Gazette, Pteridologist* and *Bulletin,* are published annually. The *Fern Gazette* publishes matter chiefly of specialist interest on international pteridology, the *Pteridologist,* topics of more general appeal, and the *Bulletin,* Society business and meetings reports.

Membership is open to all interested in ferns and fern-allies. SUBSCRIPTION RATES (due on 1st January each year) are Full Personal Members £10; Personal Members not receiving the *Fern Gazette* £7.50; Student Members £5; Subscribing Institutions £12. Family membership in any category is an additional £2. Applications for membership should be sent to the Assistant Secretary (address above) from whom further details can be obtained. (Remittances made in currencies other than Sterling are £1.50 extra to cover bank conversion charges). Airmail postage for all journals — an extra £3.50, or for those not receiving the *Fern Gazette* £2.50.

(Front cover, *Onychium contiguum* Hope, from Nepal).

Back numbers of the *Gazette, Pteridologist* and *Bulletin* are available for purchase from the Treasurer (address above), from whom further details can be obtained.

EDITORIAL

The material in this issue of the *Pteridologist* is within the well established mould, with , hopefully, something to interest every member. However, if your particular interest is not being served please let me know, or preferably submit a note or article of your own rectifying the omission. I think it is worth mentioning that contributing to the *Pteridologist* is not normally a thankless task. There is usually a healthy feed-back, and like-minded members can often establish contact as a result. Requests for plants, spores, information, etc. are also welcome. Please remember all copy should be with me by 31st December 1987 — but preferably earlier!

MISSOURI BOTANICAL

JUL 28 1987

GARDEN LIBRARY

HOUSE FERNS

GWLADYS TONGE
32 Horn Street, Winslow, Buckingham, Bucks. MK18 3AW

There must be many frustrated members who, like me, have small gardens so heavily planted that they cannot enlarge their collections of hardy ferns. But perhaps they have empty spaces in their homes just crying out for interesting and unusual tender ferns. It would be useful to hear about successes and failures in growing ferns indoors, sources of supply, and which varieties from the spore list have proved their worth as house plants.

A recent TV garden programme, 'Going to Pot', showed a range of suitable ferns (mostly unnamed). They also suggested a diminutive (but anonymous) tree fern now said to be available in garden centres. My search so far has been fruitless, but probably the price would be prohibitive anyway!

The conditions in my small Victorian house (too little light, fluctuating temperature — which is never very high) are not ideal for ferns, although that has not inhibited me from trying.

As well as easy subjects like *Nephrolepis exaltata* 'Bostoniensis'; *Asplenium bulbiferum, Pteris* in variety, I have found *Rumohra adiantiformis* and *Doryopteris pedata* 'Palmata' are quite happy here. *Adiantum peruvianum* tolerates my kitchen but my *Adiantum raddianum* 'Micropinnulum' prefers the north facing conservatory. The temperature in this dropped to 40°F last winter and I had to bring *Platycerium veitchii* into the house from December to March; *Platycerium hillii* 'Panama' and *P. bifurcatum* endured the low temperature, and all three came through their respective ordeals unscathed. *Asplenium nidus* and *Woodwardia fimbriata* also coped with the low conservatory temperature. The *Woodwardia* is very handsome but I have not dared risk it in the house yet.

Nephrolepis exaltata 'Suzy Wong' is growing quite strongly in a terrarium with one open panel, and also in a hexagonal open-sided glass planter. I should very much like to find some of the lovely varieties of *Nephrolepis* shown in *Ferns for Modern Living* by Elaine Davenport. Even fanciful names like 'Fluffy Ruffles', 'Petticoat', 'Mini-ruffle' and 'Shadowlace' do not lessen their desirabilty. Why do we never see them?

It seems to me that there is great scope for experimentation and exchange of information in this area of fern growing.

Footnote: The nephrolepis varieties mentioned here are popularly grown in Florida and in the Los Angeles area, in both of which I have seen the most wonderful specimens. The Los Angeles International Fern Society may be able to help here. *J.W. Dyce*

FERNS IN NEPAL

ROBERT SYKES
Ormandy House, Crosthwaite, Kendal, Cumbria LA8 8BP

Articles in this journal usually show such competence and careful research that I am embarrassed to reveal my ignorance and muddling in Nepal, but it was interesting and fun, so bear with me.

I went with a party of six in November/December 1985 to attempt a ski ascent of a mountain out there. In the event conditions prevented us even getting to the foot of it, but we did get to 20,000' and had a marvellous time.

I found it extraordinarily difficult to find out anything in advance about the ferns and was therefore thrilled to read the article by Vidya Laxmi Gurung in the 1985 Fern Gazette about ferns in the Langtang National Park. Even so I had no means of putting faces to her evocative list of some 150 species.

I arrived with a photocopy of that article, a Ministry of Agriculture permit to import up to 2 kilograms of plants, an A4 pad and some spore envelopes.

I hoped to see Dr. Gurung when passing through Kathmandu on the way out and get some hints on what I might see, and how I might identify it. In the one day we were there, I found the Department of Medicinal Plants (which features in her address in the Gazette) but she was away and so I set off eager but uninformed.

We took 8 days to walk from Jiri (6,000') to Namche Bazar (11,200') near the Mount Everest reg on of east-central Nepal, at which height at this season the ferns petered out. We were walking about 8 hours a day with a long lunch break. We were supported by a team of porters who carried all but the immediate needs of the day, so although we were for ever climbing up and dropping back down again, it was never excessively strenuous. The terrain is extremely varied from hot moist sub-tropical woodland in the valley bottoms,through more open pine, birch and rhododendron to open scrub on the higher ground. Towards the end of the trip two of us walked out eastwards to the Arun valley. I cannot tell you altitude because we walked off our maps, but we were dropping into hot valleys with a different flora again. Much of the country is cultivated, of course, and the walls and terraces extend the range of habitats.

The ferns are correspondingly numerous and varied.

It was not easy to be systematic and yet maintain the impetus of our journey. I started simply collecting spores, but quickly realised that no-one would then be able to tell me what I had got. I then started folding fronds into my pad, and soon built up a cumbersome and unstable portfolio. I reckon to have differentiated by these crude methods about 60 species. There were certainly far more. There were many *Polystichum* species, all delightful; great banks of *Nephrolepis;* various *Pteris* and *Adiantum* species; a handsome *Blechnum; Aleuritopteris* in the walls, mostly, but not all, curled up like our own Rustyback in a drought. *Aleuritopteris albomarginata* is larger than most and exquisite. I found it growing on the bank at the edge of a rice paddy terrace. Many of the trees and rocks were swathed in epiphytic ferns, with rhizomes like polypodies, but as thick as one's thumb. These catalogues become boring and the accuracy of this one is doubtful, but I must mention one superb plant, *Pseudodrynaria coronans* (Wall ex. Mett) Ching which I saw growing among rocks but also, as its name suggests, like a giant crown around a tree. It has magnificent pinnatifid fronds about 4 feet long with each pinnule comparable in size and form to a frond of hartstongue.

Back in Kathmandu, maddeningly, I was separated from my portfolio. I went without it to see Dr. Gurung at the Royal Botanical Gardens up at Godavari above the city. She was kindness itself. She identified unhesitatingly the few fronds I then had with me, but most

Fig. 1. Ferns in Nepal
a) *Asplenium ? indicum* Sledge, b) *Polystichum mehrae* Fras-Jenk & Khullar,
c) *Polystichum atkinsonii* Bedd., d) *Polystichum obliquum* (Don) Moore,
e) *Ceterach dalhousiae* (Hook.) C.Chr., f) *Coniogramme ? caudata* (Wall, ex Etting.) Ching in C.Chr.,
g) *Polystichum nepalense* (Spreng.) C.Chr.

Fig. 2. Ferns in Nepal
a) *Lindsaea adorata* Roxb., b) *Polystichum stimulans* Presl., c) *Davallia tichomanoides* Blume, d) *Aleuritopteris ? albomarginata* Clarke.

of them, frustratingly, remained nameless. For all that it was a most interesting visit. Her department started a herbarium in 1960. In 1976 they published a *Catalogue of Nepalese Vascular Plants,* listing 308 species of Pteridophytes, the latter having been written by Dr. Gurung (Gurung 1976). She estimates that there are in fact about 500 species. The Pteridophytic section of the herbarium assembled by her and her staff is magnificent. She described to me how, on collecting trips, she sat up late into the night arranging and recording her material. I can believe it. Perhaps it is as well I was not able to show her my disorganised gatherings. She would have been very shocked.

There are bird books and flower books in Kathmandu but no book enabling the amateur to identify Nepalese ferns in the field. Perhaps there is no demand for it; Dr. Gurung is accustomed to visits from pteridophytic professionals, but I think she found the eager and ignorant amateur a strange phenomenon. She showed me the Botanical Garden collection, modest by the standards of the herbarium, but of great interest to me — what a relief to see a few labels!

I have taken some photocopies of some of the less tatty survivors of my collection (with which I was eventually reunited). I have sown 30 odd pots of spores, and have a few rhizomes sprouting rather hesitantly.

So when is the Society running its first field trip to Nepal? For the ferns late September to mid-October is the time to go — just at the end of the monsoon. It is costly to travel but relatively cheap once there — perhaps £1,500 - £1,800 for the trip of a lifetime, with not only a superb range of ferns, but the warmest of welcomes and the finest mountain scenery in the world. You cannot go on revisiting the *Dryopteris* hybrids for ever.

References:

GURUNG, V.L. 1976. Pteridophyta. In S.B. Malla et al (Eds), Catalogue of Nepalese vascular plants, *Bull. Dept. Med. Plants Nepal* **7**: 1-27.
GURUNG, V.L. 1985. Ecological observations on the Pteridophyte Flora of Lantang National Park, Central Nepal. *Fern Gaz.* 13 (1): 25-32.

FOOTNOTE:

Thanks to the enthusiasm of your editor and the skill and kindness of Christopher Fraser-Jenkins I can now put names to my photo copies — and he says there are many more *Dryopteris* hybrids in Nepal too!

BOOK REVIEW

AN INTRODUCTION TO FERN GROWING by Jean K. Marston, 30pp., 20 black and white illustrations. 1986. Price £2.50 including postage, available from the author, Culag, Green Lane, Nafferton, Nr. Driffield, E. Yorks.

This booklet is Jean Marston's response to many requests over the years for advice on how to grow ferns. It is printed direct from typed sheets, and in style resembles recent catalogues. The booklet emphasises the basics of fern growing, and gives an annotated list of selected species and varieties for culture in the open or in the cool greenhouse. The final section of the book is given over to lists of ferns for different situations. These lists will be useful and are obviously based on many years' observations.

The book is illustrated in black and white, and all round will form a good starting point for the newly converted fern grower.

MARTIN RICKARD

ATHYRIUM FILIX-FEMINA 'PLUMOSUM SUPERBUM DRUERYI' ET AL

J W DYCE
46 Sedley Rise, Loughton, Essex

Following the paper by Vic Newey in last year's *Pteridologist* on bulbil production on Lady Ferns, with particular reference to the phenomenon of their appearance on the backs of fronds of *Athyrium filix-femina* 'Plumosum superbum Drueryi', Martin Rickard has been "at me" again to write up an in-depth history of the progenitor of the fern, *A.f-f.* 'Plumosum Axminster', a wild find by J Trott in 1863 from the Axminster area in Devon, and its remarkable progeny. Fortunately, not only have I all the publications of our Society from its beginning in my possession, but also the present custody of what can be truly called its most valuable possession — for the fern variety grower and collector, the Press Cuttings of C T Druery, eight huge volumes into which Druery, from 1882 up to the time of his death in 1917, inserted cuttings from newspapers, gardening and scientific journals of all his prolific published writings. Druery, it was, who made the big "break-through" in the second and third generations from the wild find of *Plumosum Axminster,* and, naturally, his writings are pretty full of it — and I am profiting accordingly!

A.f-f. 'Plumosum Axminster' was a very good plumosum or extra feathery wild find (see Fig. 1b). It also bore numerous bulbils on the backs of the fronds, an interesting and not common development on the Lady Ferns. The fern was distributed by the finder and found its way into many of the best collections of the day. It was propagated from spores for many years and the results spread around amongst interested growers, but its progeny was always the parental or near-parental type until, one year, a grower named Parsons noticed a superior form, with much finer cutting, in one of his sowings. This was named *Plumosum elegans Parsons* (Fig. 1c). It was fertile and also had the bulbiferous character of the parent. Like its parent it was distributed widely.

Some time later, following correspondence with Druery on the subject of bulbiferous hardy ferns, a grower named J H Fitt sent him a very bulbiferous and fertile pinna from *P. elegans Parsons.* Druery was attracted not so much by the bulbils but by the beauty of the pinna, and both he and Fitt made sowings from the spores. Both sowings produced crops of almost all very foliose plumosums with heavy crests, a surprising and unexpected but very interesting result since neither the parent nor the grandparent had the slightest suggestion of cresting. Apart from a few, all were very similar in type but all had deficiencies, pinnae showing pinnule blanks or other deformities. Only two plants were uncrested and were, unmistakably, the parental type, *P. elegans Parsons.* Fortunately, among the others in his sowing, Druery spotted a perfectly crested plant, and this he concentrated on. It developed into his *Plumosum superbum Drueryi* (Fig. 1d), an extremely robust plant with broadly foliaceous and plumose fronds, with much finer cutting than the parent and bearing even and fine tasselling throughout, splendidly developed; even the pinnules were broadly formed, fanning out into wide sub-crests. It has been called the *Mother of the Superbum section* and still remains unequalled. Fitt was not fortunate enough to find such a plant in his sowing.

In its second year, 1887, this plant produced a few spores and about 120 plants were raised from them. These were in *two distinct* sections, one *with cresting of every kind,* furcate to heavy grandiceps, the other *quite uncrested plumosums.* No two plants were alike. Only one was like the parent but an improvement on it — a percristatum with even the pinnulets fanned out. This was named *Plumosum superbum percristatum Drueryi.* It was completely uniform in its build and divided to the fourth degree with extremely fine divisions. The frond tips had heavy delicately comminuted heads, the pinnae had broad splayed tassels, the pinnules had pretty fan-shaped ones and the pinnulets were fanned out and serrated at the tips. (Druery's description). Previously, *percristatum* applied only

to forms in which the pinnules, the *secondary* division, were crested but in *P. superbum percristatum* the *tertiary* divisions were distinctly fanned out into delicate points. This fern was the finest existing crested form. Druery found that this variety was not so robust in habit as its parent. *P. superbum Drueryi,* and grew to only about two feet high. We are not told the height of the parent.

Fig. 1. Evolution of *Athyrium filix-femina* 'Plumosum Drueryi'
a. Pinna of *Athyrium filix-femina* normal; b. *A.f.-f.* 'Plumosum Axminster'; c. *A.f.f.* 'Plumosum elegans'; d. *A.f.-f.* 'Plumosum superbum'; e. *A.f.-f.* 'Plumosum Drueryi'.

In spite of the furore which this fern created in the fern world at the time, and the screeds that were written about it, it is a surprising fact that I can find no trace of a good photograph or other kind of picture which clearly illustrates its details. The one I show here (Fig. 2) is taken from Druery's *British Ferns and their Varieties,* page 115, and claims only to depict *one* of the percristate superbums and not Druery's named one. The same photograph appears also in other publications of the time and cannot be said to be a very helpful one.

Fig. 2. One of the percristate superbums

It is interesting to note here a statement by Druery that *P. superbum Drueryi* declined to repeat its first performance from its spore progeny. Later sowings yielded only fair types on its own lines. Also, whilst most other members of the "family" produced bulbils, *P. superbum* itself did not. I cannot say if this still applies, and perhaps some present growers can inform us differently — *provided,* of course, they are growing the original plant, and not one of its lesser look-alike relatives. I have more to say about this later.

Fig. 3. *Athyrium filix-Femina,* 'Plumosum Drueryi'
Accepted by H.M. Queen Victoria

Among the *uncrested* plumosums in the sowing one stood out from all the others. It was nurtured and developed into the incomparable *Plumosum Drueryi* (Figs 1e and 3). It was a very large-growing plant and five times divided with heavy, feathery and light-green fronds. It was far and away the finest plumose lady fern in existence. A singular feature was its almost evergreen habit. Whereas its relatives in the greenhouse all died down in October, this fern, in the same house, remained quite green at Christmas time and rose, in the spring, several weeks before the others.

Plumosum Drueryi became extremely popular in the fern world and was known as "P.D." among its worshippers. The Royal Horticultural Society awarded it a First-class Certificate in 1891, and the following year it was the Best Fern in the Show. Superb specimens of both "P.D." and *P. superbum percristatum Drueryi* were presented to Queen Victoria at Windsor and graciously accepted by her — I wonder if the plants are still at Windsor?!

A big discrepancy appears in some of the statements concerning the size of this fern — it is described by Druery in one of his papers as being five feet high and very broad, nearly two feet wide, with pinnae five inches in *width* and pinnules more than one inch wide. In another article, not by Druery, it was 18 to 24 inches high and 6 to 8 inches wide. I would think the latter dimensions were taken from a poorly-grown *out-of-doors* plant — Dr Stansfield states it was at its best when grown under glass. According to a photograph in my possession (Fig 3) the larger size seems perfectly feasible — but, I feel there was *some* exaggeration! Druery *did* tend to become over-enthusiastic at times over pet plants! I have to admit he is not alone there! In *Fig. 1e* the pinna of *Plumosum Drueryi* is shown to be very much larger than the other pinnae depicted, implying that the variety was indeed

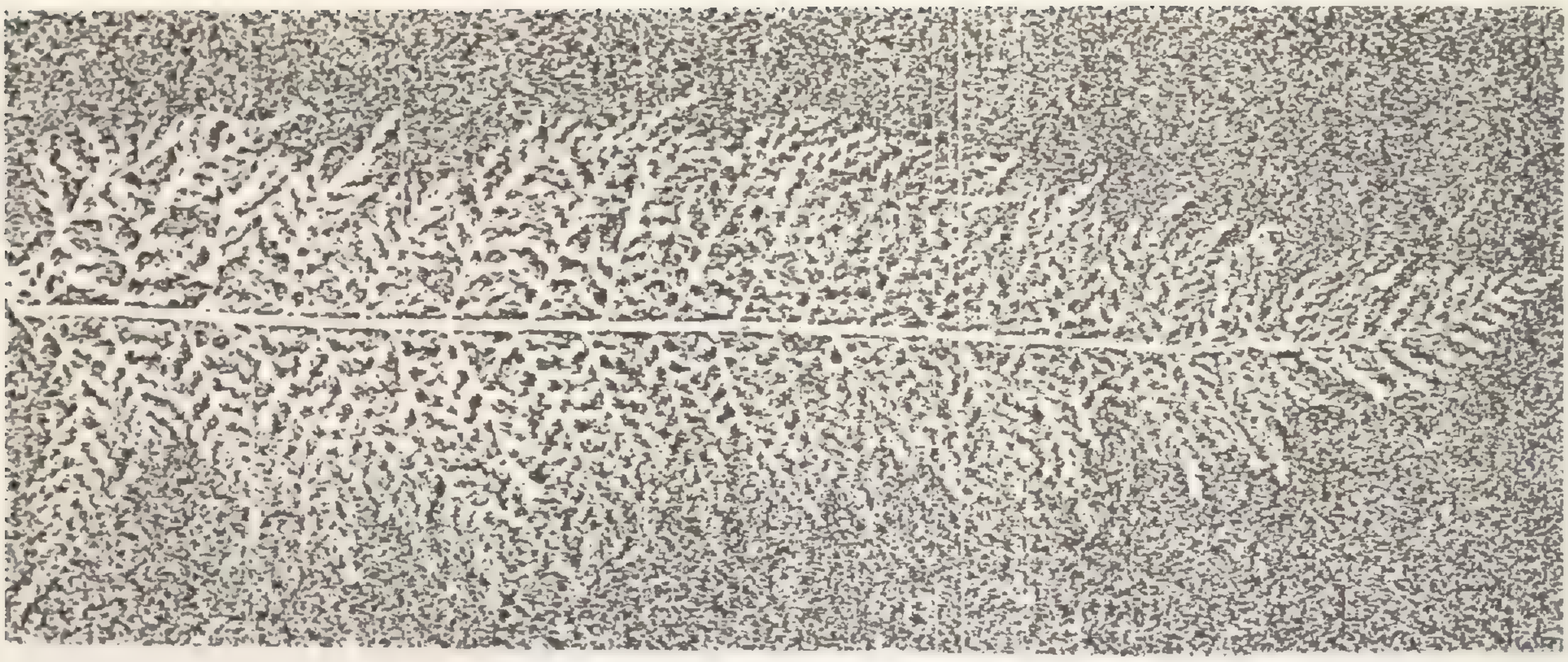

Fig. 4. *Athyrium filix-femina,* 'Plumosum elegans Parsons'

much larger. However, I have a very old and very faint photographic impression of a pinna of *P. elegans Parsons,* showing it to be very much longer than the one in *Fig. 1.* I hope it reproduces clearly enough to give some idea of the size of this fern (Fig. 4). The impression was made sometime around the beginning of the century. This appears to indicate that the variety compared quite well in stature with "P.D.", and possibly the other two did as well — the only *scale* differences likely to be correct in Figure 1 are those between the varieties and the normal species form (Fig 1a).

"P.D." produced spores and bulbils profusely but Druery succeeded only once, by close cultivation, in bringing a bulbil through the winter — it produced a plant quite true to the parental type. In some seasons the frond backs were covered with the bulbils bearing developed young fronds. Spore sowings yielded *all* uncrested plumosums similar to the parent.

In the sowing from the spores of *P. superbum Drueryi* were many other first-class plants, both crested and uncrested. In the cristate section some were magnificently crested to the fourth degree, with distinctly tasselled pinnulets, but not quite up to the standard of *P. superbum percristatum Drueryi.* In the uncrested section some closely rivalled *Plumosum Drueryi,* with finely dissected fronds and robust constitutions. Many were named — crested ones, *P. superbum grandiceps, P.s. kalon;* uncrested ones, *P.s. crispatum, P.s. dissectum, P.s. foliosum, P.s. plumosissimum.* There was also among them a very fine dense crispy form named *P.s. densum* which Druery mentions as one of his "happiest acquisitions" from the sowing. Does anyone know it today? It would be a gem of the first-water! Other plants of almost equal merit were *not* named. The whole batch, achieved in four generations from the normal wild form and in three generations from the *Axminster Plumosum,* constituted a most remarkable and easily recognisable two sections which stand alone — even in their offspring they were easy to recognise. A very large number of plants was raised from their spores and from the bulbils of the bulbiferous ones.

I don't know how many of these plants survive today — at any rate, by name. Judging from their reported production rate, they can still be around in great numbers. I don't propose to give them further special attention — *apart from giving a warning.* It will be noted from what I have just written that not only were the three prominent and outstanding varieties, *Plumosum superbum Drueryi, Plumosum superbum percristatum Drueryi* and *Plumosum Drueryi,* grown by the enthusiastic fern-men of the day, but also, in great numbers, the other plants of lesser merit and their offspring. The whole must have constituted a real treble assorted conglomeration of excellent, but really very much alike, varieties, out of which we are today expected to pick out the three elite ones! Can we? — I doubt it, and we are left with an assembly of three sub-sections, a crested *Plumosum superbum* one, a crested *Plumosum superbum percristatum* one and an uncrested *Plumosum Drueryi* one.

I think that today we must settle for the three sub-sections and leave it at that. Some growers today may assert they have the genuine varieties, passed down to them *direct* from growers in the early years of the *Axminster* "explosion", but, in the light of what actually happened, could those early growers be any more sure than we are that they had the real things and not look-alikes? There I leave it.

It is pleasing to know that we have members today, like Vic Newey, experimenting actively with *Plumosum Axminster* progeny. Both Martin Rickard and I have been keeping in close touch with his work. A follow-on paper to his article in last year's *Pteridologist* appears in this issue.

APPENDIX

Genealogical Tree of the *Athyrium filix-femina* 'Plumosum Axminster' progeny.

1. *Athyrium filix-femina* – normal wild form.

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2. *A.f-f.* 'Plumosum Axminster' – wild find in Devon. NOT CRESTED.

↓

3. *A.f-f.* 'Plumosum elegans Parsons' – NOT CRESTED.

↓

4. *A.f-f.* 'Plumosum superbum Drueryi' – CRESTED TO FOURTH DEGREE.

↓

5. *A.f-f.* 'Plumosum Drueryi' – NOT CRESTED.

'Plumosum superbum percristatum Drueryi' – CRESTED TO FOURTH DEGREE.

ALSO –

'Plumosum superbum grandiceps' – CRESTED TO THIRD OR FOURTH DEGREE
'P.s. kalon – CRESTED TO THIRD OR FOURTH DEGREE
'P.s. crispatum – NOT CRESTED
'P.s. dissectum – NOT CRESTED
'P.s. foliosum – NOT CRESTED
'P.s. plumosissimum – NOT CRESTED

PLUS – many others not named.

} ALL FROM SAME BATCH OF SPORES

CLASSIFICATION OF FERN VARIATION IN BRITAIN

J.W. DYCE
46 Sedley Rise, Loughton, Essex

Very early in my life with ferns their very many beautiful variations started to become a major interest but their vast numbers and complexity were rather daunting to my beginner's mind. I quickly decided I had to sort things out and I welcomed the little book by E J Lowe, *British Ferns and Where Found,* which contains a very good classification system. However, it is not concise nor is it tabulated, something which my tidy mind demanded, but it was something on which to build and my first efforts towards my own table owe much to this book. In 1963 I published an elementary system for *Polystichum setiferum* in the *British Fern Gazette,* Vol. 9 part 4. This was used in modified form by Reginald Kaye in his book *Hardy Ferns.* Over the years, as my knowledge of variation increased, my table gradually evolved to cover all types of variation in the British ferns, and I am fairly satisfied now that it is comprehensive enough for all practical purposes. Over the years several fern growers have made helpful suggestions and, in particular, I would like to mention Clive Jermy whose suggestions were revolutionary but most valid and I hastened to incorporate them in this final result.

DIVISION A. VARIATION IN (SHAPE OF) SKELETON OF FROND

GROUP 1. *CRISTATUM* – Repeated terminal division or cresting.

(a) *Capitatum* — at frond apex only.
(b) *Cristatum* — at pinnae tips, with or without apical cresting.
(c) *Percristatum* — at pinnae tips and at pinnule tips, with or without apical cresting.

GROUP 2. *RAMOSUM* — Major skeleton division

(a) *Ramosum* — main leaf stalk (stipe and/or rachis) divides once or repeatedly.
(b) *Cruciatum* — secondary leaf stalks (pinnae) divide one or more times at junctions with main stalk.
(c) *Brachiatum* — basal pinnae elongate to form separate fronds.

GROUP 3. *OTHER SKELETON CHANGES*

(a) *Angustatum* — pinnae greatly reduced in length with consequent narrowing of frond.
(b) *Deltatum* — pinnae elongated progressively towards the frond base to create deltoid shape.
(c) *Parvum* — frond normal in shape but greatly reduced in size.
(d) *Congestum* — spacing between pinnae and between pinnules greatly reduced causing overlapping of leafy parts, often combined with brittleness.
(e) *Revolvens or Reflexum* — pinnae and/or pinnules reflexed to give tubular appearance to frond and/or pinnae.
(f) *Depauperatum* — pinnae and/or pinnules reduced, irregular or missing.

DIVISION B. VARIATIONS IN DEGREE AND FORM OF DISSECTION OF FROND BLADE OR PARTS THEREOF.

GROUP 1. *DISSECTUM* – Margins incised or indented.

(a) *Dentatum* — pinnae or pinnules with shallow regular teeth.
    1. *Crenatum* — with rounded teeth.
    2. *Serratum* — with pointed saw-like teeth.
(b) *Setigerum* — pinnules indented deeply into narrow segments with pointed teeth or bristles.

(c) *Laciniatum* — frond, pinnae or pinnules torn deeply into narrow irregular pointed lobes.

(d) *Incisum* — pinnae or pinnules deeply and regularly indented.

GROUP 2. *DECOMPOSITUM* – Pinnule sub-division into pinnule-like parts.

(a) *Plumosum* — pinnules large and divided one or more times giving feathery appearance; with some exceptions sori absent or very scanty.

(b) *Tripinnatum* — pinnules enlarged and divided into distinct pinnulets, or merely lobed — throughout whole frond.

(c) *Subtripinnatum* — pinnules enlarged and divided into distinct pinnulets, or merely lobed — restricted to parts of frond.

GROUP 3. *DIVISUM* — Divided; restricted to *Polystichum setiferum.*

(a) *Multilobum* — pinnules greatly enlarged, very divided, final segments wide and foliose; texture soft, *not glossy.*

1. *Multilobum* -- divided up to three or more times.
2. *Plumoso-multilobum* — even more enlarged and divided, final segments pinnule-shaped, densely massed and overlapping, building up into a frond thickness of one inch or more.

(b) *Acutilobum* — pinnules narrow, undivided or sharply serrate, very pointed; basal lobes distinct, completely or almost separate, narrow, sharply pointed; texture hard, glossy.

(c) *Divisilobum* — pinnules greatly enlarged, very divided, final segments very narrow.

1. *Divisilobum* — divided up to three or more times, final segments elongated and pointed, texture hard to semi-soft, glossy.
2. *Plumoso-divisilobum* — even more enlarged and divided, final segments tend to be slightly wider and softer, semi-glossy; pinnae wide and very overlapping but not dense, preserving an open appearance.

(d) *Pulcherrimum* — lower pinnules and rarely the upper ones greatly extended, slender, sickle-shaped, deeply divided; points run out into slender twisted threads capable of producing prothalli; texture soft.

(e) *Conspicuilobum* — pinnules round, undivided; basal lobes separate and distinct, very round, texture soft.

GROUP 4. *FOLIOSUM* – Leafy.

(a) *Foliosum* — pinnules wide and leafy, not divided, often overlapping.

(b) *Rotundatum* — pinnules broad and rounded.

DIVISION C. OTHER VARIATIONS

GROUP 1. *RUGOSUM* – Blade surfaces leathery and uneven, restricted to *Asplenium scolopendrium*

(a) *Marginatum* — fleshy ridges on under and/or upper frond surfaces, parallel to midrib, usually marginal; often combined with *Muricatum.*

(b) *Muricatum* — frond surfaces rough and leathery, covered with short hard excrescences.

GROUP 2. *OTHER PINNULE CHARACTERS.*

(a) *Crispatum* — pinnules twisted or crisped.

(b) *Linearum* — pinnules very narrow and undivided.

(c) *Variegatum* — changes in colour.

DRYOPTERIS SUBMONTANA AND POLYSTICHUM LONCHITIS ON LIMESTONE PAVEMENTS

N J HARDS
Holme Cottage, Kyme Road, Heckington Fen, Sleaford, Lincs. NG34 9NA

Limestone pavements form an extensive apron round each of the Three Peaks of Yorkshire, those round Ingleborough being the most extensive while those around Whernside and Pen-y-Ghent are more patchy. The topmost surface of all these pavements is the top of the Great Scar Limestone, in the Lower Carboniferous.

Above this is generally a fairly flat, boggy area formed by the lowest shale bed of the Yoredale Series, which are a mixture of shale, sandstone and limestone. There is, for example, a prominent band of limestone about 100' below the summit of Ingleborough.

However, it is the Great Scar Limestone which is of most interest to pteridologists, since the grykes contain all the typical limestone ferns. In fact virtually all the *Dryopteris submontana* in the British Isles is found on the Great Scar Limestone.

I have usually hunted round the flanks of Ingleborough (e.g. Moughton Fell), but I recalled a few years ago seeing masses of *Dryopteris submontana* on Twistleton Scar End, to the south west of Whernside. The limestone pavements extend right round from there to Chapel-le-Dale and lie at about 1200', the same height as Moughton. I therefore thought that these pavements might also contain *Polystichum lonchitis,* the real treasure from these parts, which occurs on Moughton but needs searching for.

Since *Polystichum lonchitis* is a montane species and in my experience only occurs on the highest limestone areas, I started looking on Scales Moor near Chapel-le-Dale. There were plenty of ferns including *Athyrium filix-femina, Dryopteris affinis, D. filix-mas* and *Polystichum aculeatum* in the grykes. In other words, the larger species were common, and I was puzzled that there was very little *Dryopteris submontana.* There was also no sign of *P. lonchitis.*

After a fruitless search I moved slightly lower down and immediately found that *D. submontana* was the dominant species. I also found one plant of *P. lonchitis.* There was not enough difference in height for that to be an obvious factor, nor would the top surface be significantly more (or less) exposed.

I believe an important factor to be the physical character of the limestone. The Great Scar Limestone is described in the British Regional Geology guide as 'thick bedded gray limestones often showing oolitic structure, with some calcareous grits.' All these limestones have a well-developed system of vertical and horizontal joints. The vertical joints are the main site of water penetration, and this gradually forms the characteristic grykes. In the limestones with the calcareous grits both the vertical and the horizontal joints are generally closer together with the result that the grykes are generally closer together and not so deep. The extremely deep joints in the typical thick-bedded limestone (possibly 4-5' deep) will enjoy a more sheltered microclimate and eventually develop a thick organic-rich soil. Alternatively, the joints may eventually become very wide and develop a layer of turf. In contrast, the grits provide a more broken habitat, less sheltered and more rocky. The rocks are also somewhat porous and the soils in the grykes will contain more rock fragments and therefore be more alkaline.

In the area studied, there is a gritty band near the top of the sequence, which forms much of the surface of Moughton Fell. Above that, the top layer is the typical thick-bedded limestone with smooth-sided and often quite deep grykes. Between Moughton Fell and Gaping Gill, on Ingleborough, are extensive limestone pavements but I found no *D. submontana* (though it may be present in small quantities) or *P. lonchitis* when I searched

there. I also found no *D. submontana* on Scar Close Nature Reserve but it is abundant just to the south, again on more gritty rock.

D. submontana, and probably *P. lonchitis,* will grow on the more massive typical limestone and I suspect that the real reason they appear to prefer the gritty bands is that there is less competition. Gilbert (1970) noted that *D. submontana* tends to be absent where *Mercurialis perennis* occurs, which is the case on Scales Moor. The relative abundance of other larger fern species, as already noted, would also imply more competition. Any fissures in the sides of the grykes on the massive limestone tend to be tiny and only hold Aspleniums (*A. ruta-muraria, A. trichomanes* and *A. viride*) plus *Cystopteris fragilis.* There is a greater range of habitats in the more gritty rocks. The floors of the grykes are probably less sheltered and also lighter, so the larger species would be too exposed, whereas *D. submontana* would be favoured.

Reference:

GILBERT, O.L. 1970. Biological Flora of the British Isles: *Dryopteris villarii. Journal of Ecology* 58: 301-13.

A NEW VARIETY OF PLATYCERIUM BIFURCATUM (CAV.)C.CHR. SSP. WILLINCKII (T. MOORE) HENNIPMAN & ROOS

RALPH H. HUGHES
1546 Del Rio Drive, Fort Myers, Florida 33901, USA

The purpose of this paper is two-fold: (1) a report on extension in the natural range of *P. bifurcatum* ssp. *willinckii* from Indonesia to North Queensland, and (2) wherein collected plants indigenous to Australia were found to be significantly different from those occurring in Indonesia.

The new clone in cultivation is described as follows:

> *Platycerium bifurcatum* spp. *willinckii* 'Venose frond'. Epiphytic, growing in clusters. Rhizome much branched. Scales variable, like those of the species. Base or shield fronds resembling those of the subspecies. Normal or fertile fronds prominently venose, nodding, becoming longer and more pendant with age than the species, but less decumbent than the subspecies, the ultimate divisions typically narrow, strap shaped, forking two or three times, up to 30cm long and 2cm wide, or short, wedge shaped and obtuse, the upper surface typically blue green and the underside covered with white stellate hairs having a brown center. Sporangia mostly wanting. (See photograph opposite p. 158.)

The epithet describes a conspicuous feature of the fern. Its venose foliage (fertile) fronds display conspicuously ribbed strands of vascular tissue mostly parallel the length of the frond, these comprising grooves on the upper side and ridges on the under surface. Other distinguishing characteristics are its gracefully arching, dark, bluish green foliage fronds, and ultimate segments of which are usually short, very wide and obtuse, and its deep incisions on the upper margins of base fronds.

The *P. bifurcatum* group when grown from spore has a history of poor survival and slow growth. Length of growth cycle to adult size is 4-5 years and to produce spores is 6-10 years — the losses occurring mostly the second year. Accordingly, evaluation was hampered by losses in 1986 of plants from spores planted 2/85, these comprising straplike leaves 8 to 12cm in length. Even so, all individuals were identifiable with the

parent. However, any likelihood of finding a superior offspring was hampered by the lack of mature spore-grown progeny.

Growing imported plants, i.e., divisions or "pups" with live foliage fronds 30-40cm in length, was relatively easy and similar to others of the species grown outdoors in southwest Florida. Following the third annual growth cycle in cultivation, the foliage fronds, mostly lacking sporangia, measured 40 to 80cm long and base fronds 20 to 40cm in height.

According to a resume of several observers (pers comm), distribution is limited to very wet mountain ranges near Mt. Lewis, Mt. Fraser and Mt. Spurgeon inland from Cairns and Cooktown. Habitats most frequently occur in tropical rainforests 700 to 1000m above sea level where variations in temperature and humidity during a day are greater than variations of monthly means, and drought periods coincide with the cool season of the year. *P. bifurcatum* ssp. *willinckii* 'Venose frond' often grows exposed to the sun on lofty branches of emergent trees, but within its range also occurs in shade of relatively open forests.

Because propagation from spores is difficult and plantlets or pups are produced freely by adult plants, the new variety is best propagated vegetatively. The pups are easy to grow and may be expected to continue to thrive with ordinary care prescribed for the species (Hughes 1984). While completion of the growth cycle from planted spore at hand is awaited, habit in cultivation may be expected to portray characteristics distinct from the species and subspecies.

Reference:

HUGHES, R.H. 1984. *Platycerium bifurcatum* in the wild and in cultivation. *Fiddlehead Fourm 11* (4): 17-21.

SHORTER NOTE

Fern raising for free (well not quite)

The average supermarket already contains many items useful for the enthusiastic fern grower. You may have to adjust your eating habits slightly, or, failing this, your friends may well be trained to change theirs and give you the empty containers.

Some low-fat spreads come in transparent-lidded boxes which are ideal for spore-raising. Pricked out sporelings are quite happy in rectangular margarine and ice-cream containers. Use the lid as spill tray.

Flower pots? Whenever I go to anywhere serving refreshments in throwaway cups I usually persuade them to let me have the empties. Last year I got a large carton full from a local fete. My family disassociated themselves from me entirely during this transaction...

Transparent cups make mini-propagators when upended on pots and pierced for ventilation. Decorate large and small margarine and cottage cheese tubs for pot containers. Speed up greenhouse watering by placing pots on twin tub washing machine lids. Some will take up to 72 little yoghurt pots full of plants.

Lastly, labelling. I cut up washing up liquid bottles to suitable pieces and use spirit-based felt pens for writing.

I haven't found a way to get free compost yet. Someone out there please tell me...

ROSEMARY HIBBS

The new glasshouse at Kew: John Woodhams and Peter Bradley with 'rock' wall on right (photograph by Harry Taylor)

Platycerium bifurcatum ssp. *willinckii* 'Venose frond'

The new glasshouse at Kew: Peter Bradley placing label on Selaginella in the New Guinea bed. *Marattia werneri* on right. (Photograph by Harry Taylor)

The new glasshouse at Kew: Clive Jermy and Peter Bradley by the Indian bed. New Guinea on right, and Malaysia on left. (Photograph by Harry Taylor)

FERNS AT KEW GARDEN — A REVIEW

CLIVE JERMY
British Museum (Natural History), Cromwell Road, London

JOHN WOODHAMS
Royal Botanic Garden, Kew, Richmond, Surrey

It was over 25 years ago that the senior author was first introduced to the ferneries at Kew. The Supervisor in charge was our late and highly respected member, Bert Bruty, often seen on our annual excursions until the late 70's. Bert had three fern show houses, Tropical (No. 2), the Temperate House (No. 3), and the filmy fern house dropped in on the side of No. 2. Nearby were two narrow 'pits' for propagation, where every February Bert would sow a vast array of spores under the stone benches. Apart from the filmy-fern house which was landscaped — it was a walk-in Wardian Case, the others had display ferns in pots on stepped staging, but on the walls of a section called 'The Chapel' tropical polypods and davallias romped and a centre bed contained tree ferns. Selaginellas and a few species requiring high humidity (e.g. *Thelypteris decussata* with spectacular mucus-covered croziers) were kept in glass-fronted cabinets. Hanging baskets held adiantums (Cv. 'Kensington Gem') and nephrolepis. Number 3 had also staging with vertical wires at each end where *Lygodium japonicum* annually grew to the height of the house, and at the west end was a pile of brick rubble and bracken peat over which *Dicranopteris linearis* scrambled. Bert had learnt his tropical ecology working on the Burma railway during the Japanese War, and his cultivation of this *Gleichenia* was a breakthrough. The Assistant Curator at that time was Lou Stenning, a traditional gardener who gradually accepted Bruty's radical changes. CJ can remember being in the potting shed when Bert was planting epiphytic clubmoss cuttings in Sphagnum moss. Stenning came in and suggested authoritatively that they would do better in loam. Bert's indignation had to be seen as well as heard when he said, "Loam don't grow on trees, Mr Stenning. You know that!"

During Bert's tenure, most of his assistance came from the 6-monthly intakes of student gardeners, for permanent staff were hard to find or keep, although a full-time gardener and an assistant were part of the complement of the Fern Unit. JW worked with Bert for one and a half years as an 'Improver Gardener' before joining the Kew Diploma Course and returned in 1970 to understudy Bert prior to his retirement later that year. Towards the end of Bert's career the New Filmy Fern House on the north side of the Orangery (which in those days housed oranges and not books) was built. Bert with the help of a bricklayer and students built the tufa wall and waterfall, and dressed this even bigger Wardian Case, which had to be looked at through plate glass. This very cool viewing corridor gave Bert a place to grow Japanese and Himalayan ferns, especially polystichums. The old filmy fern house was later pulled down to give way for the new Mess Room and JW's office. Mr Stenning's deputy, Stan Rawlings took over the Tropical Assistant Curator's mantle until his own retirement in 1972 and his place was then taken by John Warrington, a man with different ideas. It was during his term of office that large scale landscaping throughout the Tropical Department was undertaken and ferns were no exception. New nursery facilities now existed in a large complex near Kew Palace (the Lower Nursery, housing also the Micropropagation Unit and Curator's Offices) and these absorbed the research and stock plants that were used to refurbish the attractive newly landscaped Number 2 and 3 Houses. The 'Chapel' was put down almost exclusively to selaginellas growing in near to natural forest conditions created by JW, whose post was now labelled Supervisor of the Ferneries, and his full time fern Propagator. More interesting material was now coming into Kew from regular collectors, from students finding themselves abroad, and from

botanists like T.G. Walker, A. Braithwaite, Clive Jermy*, Kew herbarium staff, and the garden staff themselves, who could no longer rely on being prisoners of war in order to get their tropical experience!

So much for history. Bert's propagating pits and Houses 2 and 3 were being razed to the ground as the authors discussed this article in November 1986. Nostalgic as that was, its replacement, the Princess of Wales Conservatory, was even more exciting. JW was promoted in 1981 to Assistant Curator of the Tropical Department and Peter Bradley to Supervisor of the fern collections. Both had considerable input to the new house.

The concept of the new Conservatory began in the early 1970's when the Curator, John Simmons, was developing ideas for future display areas particularly for the tropical herbaceous material. He persuaded the authorities that the houses then used for fern, orchid and other tropical displays in what was known as the 'T' Range, should be replaced by a more efficient unit of greater architectural interest. The planning stage required a lot of homework. The Public Services Agency, the division of the Department of the Environment that is responsible for government buildings, and one of their principal architects, Gordon Wilson, after travelling around Europe and North America on a Nuffield Fellowship, prepared the architectural plans. Eventually in the autumn of 1983 building commenced on the site of the demolished T-range.

The almost diamond-shaped block contains ten zones within it from a cactus and succulent area to a walk-in mist forest cabinet. There are areas of open water with the Victoria Waterlily, and various landscaped banks ranging over a height of a three-storeyed house, with orchid, insectivorous, and mixed herbaceous zones, plus a small section to display seasonal tropical forest. At the northernmost end is an area set aside for purely decorative display. Beneath much of the house are the service areas and computerised control room to maintain the ecological parameters and regulate air, mist-flow and light, and indeed, under the main tropical fern area which is the highest point of the building, are the three gas-fired boilers.

The display of ferns is mainly tropical, with a day temperature of 21°C and 18 at night. The area dropping from the top high level to ground floor is not quite as large as the old House 2, nor does it have quite the same scope for visual display as the previous display house (No. 2) could offer, but time will show. The planting out, which took five months, was done entirely by Peter Bradley and his team. The outstanding piece is a 10m high 'rock face' (composed of fibreglass and made by Stephen Greenfield) with a falling cascade of water which Peter cleverly engineered to give maximum effect and prevent water leaking out all over the face. The wall, with bracken peat between the cast blocks, already looks quite mature, and amongst fine specimens already established are *Crypsinus trilobus, Davallia trichomanoides, Nephrolepis davalloides, Oleandra neriifolia, Platycerium willinckii, Polypodium verrucosum, Pteris tripartita,* (already established as a weed!), *Selaginella willdenovii* and *Vittaria scolopendria*. In the pool at the bottom of the waterfall grows *Ceratopteris thallictroides, Salvinia molesta* and *Isoetes philippenis*. The water is recirculated and very little is lost.

The overall theme is a geographical one, with size of any one planting dependent on the material available in the nursery. Propagation of ferns at Kew for the past five years has been in the skilled hands of June Barcock who is soon to leave to take up a position at Duffryn Botanic Garden, near Cardiff. All the species on the waterfall are general Malesian, but a substantial area across the path to its left is entirely New Guinean, containing many plants collected by the authors, and this blends into a Philippine group mainly collected by Michael Price. The New Guinea bed contains an impressive specimen of *Marattia werneri* and an epiphytic array of *Aglaomorpha meyeniana, Asplenium nidus,*

* CJ would like to thank all Kew staff, past and present for the dedicated care given to his collections.

Crypsinus albidosquamatus, Cyathea wengiensis, Davallodes hirsutum, Drynaria sparsisora, Microsorium cromwelli and in the ground *Chingia ferox, Culcita villosa, Diplazium esculentum, D. petiolare, D. proliferum, Pleocnemia demidiolobata, Selaginella elmeri, Tectaria bamberianum* and *Todea papuanum.* In the Philippine and Pacific area is a superb plant of *Denstaedtia samoensis.*

The path then winds down through Africa, with *Adiantum reniforme, Anemia dregeana, Asplenium aethiopicum, A. lunulatum, Blotiellia pubescens, Ctenitis lanigera, C. protensa, Diplazium ascendens, Rumohra adiantiformis* and *Selaginella versicolor,* to the West Indies and South America. The latter bed contains beautiful adiantums (*A. polyphyllum, A. peruvianum*), *Blechnum brasiliensis, Cibotium scheidei, C. regale, Equisetum giganteum, Phlebodium aureum* and *Selaginella pulcherrimum.* In the West Indies we find *Adiantum petiolatum, A. tetraphyllum, Cyclopeltis semicaudata, Elaphoglossum crinitum, Faydenia hookeri, Hypoderis brownii, Pteris altissima, P. podophylla* and *Polybotrya cervina.* Hanging in baskets are *Davallia denticulata, D. solida, Davallodes hirsutum, Platycerium grande.*

The eastern approach to the tropical ferns is from behind the waterfall through a cooler zone of 15°C during the day dropping to 11°C at night. The white, rather austere, wall that is the reverse of the rock-face will be covered (given time) with the climbing fern *Lygodium japonicum.* In the rocky beds on either side of the steps here are planted *Adiantum reniforme, Cheilanthes albomarginata, C. argentea, C. farinosa, C. pulchella, Gymnopteris mulleri, G. vestita, Pellaea paradoxa, Polypodium furfuraceum, Selaginella menziesi* and *Woodsia polystichoides.* A surprising plant that Peter has successfully established here is *Helminthostachys zeylanica.* A *Culcita macrocarpa* and *Woodwardia orientalis* give height to one of the beds. Larger herbaceous species include *Adiantum zollingeri, Arachniodes mutica, Ariostegia membranulosum, Ataxipteris sinii, Christella contingua, Polystichum fibrillosopaleaceum, P. polyblepharum* and *Pronephrium rubinerve.* This plant, though large for a member of Thelypterdidaceae, is extremely graceful in the way it holds its fronds which can extend for two metres or more. The soft tissue of its 20 pairs of pinnae is a soft peach colour on which the regular black clusters of sporangia make a fascinating picture. It was collected by Dr Tony Braithwaite on Espiritu Santo, New Hebrides. Also growing in this bed, as vigourously as it always has done at Kew, is *Quercifilix zeylanica* collected by Professor Manton in Ceylon in 1951.

Peter Bradley has certainly done a grand job in transferring the tropical ferns to this new house and already it looks as if it has been established for two or more years. Our 1987 Kew Meeting will bring both a surprise and pleasure. To some who walk past that Grand Old Man of a tree, the ginkgo that shaded the spot where 'no loam grew upon trees', there will be thoughts of former years, peoples and plants.

BOOK REVIEWS

FLORA OF THE ISLE OF MAN by D.E. Allen, 1984, 250pp. Douglas, The Manx Museum & National Trust, I.O.M. ISBN 0 901 106 23 2.

The Isle of Man is 30 by 10 miles and no part is more than six miles from the sea. Climate is thus decidedly Atlantic with little variation in both seasonal and daily temperatures. Geology is mainly acid slates overlain by glacial drift or peat, dulling the effect of two areas of limestone which are only to be seen affecting the flora in quarries.

In spite of this the flora is rich and David Allen's book is full of interest. One of the early plants collected (in 1809) was the Maidenhair Fern which is still found around the coast

especially in the SW. Allen mentioned that var. *rotundatum* was found by Rylands at Glen Maye. Is the variety distinct and does anyone still grow it?

Equisetum x litorale is mentioned and may well be confused with *E. x dycei* especially where *E. palustre* is common. *E. hyemale* can be expected as can *Hymenophyllum tunbrigense, Asplenium billotii, Thelypteris palustris* and *Ophioglossum azoricum.* The *Dryopteris aff. carthusiana* collected on Snaefell in 1969 was apparently identified by this reviewer as a possible new allotetraploid and in need of more study. One must always be conscious that the other parent of *D. carthusiana* may yet be found in NW Britain and that that could hybridise with *D. expansa* (not yet found on Man) to form such a new species. Miss Devereau's plant from the Isle of Man is therefore interesting. Perhaps the BPS should visit the Island sometime?

A.C. JERMY

A FIELD MANUAL OF THE FERNS AND FERN ALLIES OF THE UNITED STATES AND CANADA by David B. Lellinger, with photographs by A. Murray Evans, Smithsonian Institution Press, Washington. 389 pp. 263 x 182 mm. Numerous colour photographs. Price $45.00 (cloth: ISBN 0-87474-602-7), $29.95 (paper: ISBN 0-87474-603-2).

Four hundred and six taxa of fern and fern ally growing wild in Canada and the United States are described in this book. Of these 341 are depicted in colour photographs grouped in the middle of the book. Although small (70 x 45mm) these photographs are of good quality, usually showing each species in its native habitat. There are an additional 50 or so colour photographs showing close-ups of diagnostic features of critical species.

This book is not, however, a glossy coffee-table book, it is a scientific manual. There is a dichotomous key at the beginning of each section, while each species is precisely described, together with brief notes of distribution and cultivation. Entries under each species are rather brief as necessitated by a flora of 406 taxa, but I do feel some more detail could have been given, in particular, altitude range, fuller habitat preferences, and an outline distribution for each species in the rest of the world. I regret most, however, the lack of a map showing the distribution of each species within North America.

Introductory sections are fairly predictable but towards the end of the book there is a chapter where hybrid complexes are discussed in detail; despite typographical errors in the *Polypodium* flow chart, this is a most welcome feature. The glossary is excellent, and there is a long bibliography which curiously lacks many references to older floras of the areas covered. There are, unfortunately, no maps explaining the climate of the region.

This is obviously a very well researched book, perhaps too well researched in the view of some if the familiar name of *Asplenium viride* has to be lost in favour of *Asplenium trichomanes-ramosum,* and the now familar genera *Phegopteris* and *Oreopteris* have to be sunk back into *Thelypteris.* Is it significant that *Thelypteris oreopteris* illustrated here does not *look* like European material?

Despite my criticisms, which are all minor, this manual will surely be the standard fern flora for North America for many years. Anyone with an interest in this subject will want a copy. Growers and professionals alike will find the excellent colour photographs, coupled with the descriptions, of great value, particularly when identifying the many critical species. Bearing in mind the overall quality of the book and especially the colour plates the price of $29.95 for the paper edition is not unreasonable at today's prices.

MARTIN RICKARD

BULBILS ON LADY FERNS

VIC NEWEY
27 Watts Road, Studley, Warwickshire

A year has now passed since I first reported the discovery of bulbils growing upon fronds of lady ferns. These have now developed into some very interesting plants and, in particular, the range of variations produced from 'Victoriae' are turning out to be quite remarkable and distinct.

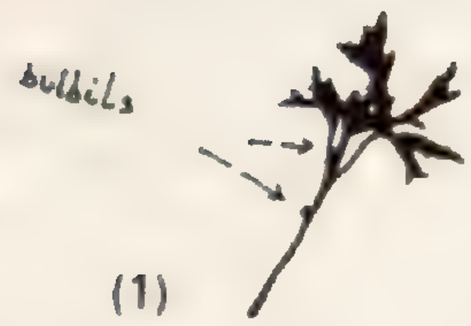
The parent form is a robust, red-stemmed 'Victoriae' (Fig. 10), the origins of which are somewhat obscure, having come into my possession as an apparently self-sown sporeling sharing a pot with a large Dryopteris variety. The original sowing developed as normal with most of the prothalli producing their tiny fronds after several mistings with tepid water; several others, however, refused to develop further even after repeated spraying and these were left until the following spring when I was amazed to find that they had increased considerably in size and I again began regular misting with a hand sprayer. After several weeks I noticed the appearance of an apparent 'bulbil' upon the *upper* surface of a prothallus, a most unusual occurrence. This ultimately began to produce small fronds and, together with several others, was pricked out into trays for growing on.

By late summer it became apparent that these plants were entirely different to anything I had seen before; bulbils (Fig. 1), the size of pinheads, were apparent on the now 2 inch fronds and these were immediately layered and placed in slight heat. During the winter months a succession of fronds were produced, many of which were also bulbiferous and these were layered in their turn. The resultant fronds were quite varied during early growth, some being extremely beautiful and delicate whilst others were somewhat inconstant, occasionally betraying their 'Victoriae' origins by being cruciate (Fig. 2) and it is interesting to note that in the bulbiferous forms the rachis is always green. One form, in particular, has now settled down and remained dwarf with numerous bulbils evident (Fig. 3), whilst others appear to outgrow this ability as they grow larger; one bulbil form has produced a few spores which I have sown in anticipation. The best form yet raised has the most beautiful fronds (Fig. 6), the pinnules fanning out and becoming fimbriate when grown close; another plant, raised from a bulbil, has dense overlapping pinnae (Fig. 7) whilst yet another (Fig. 8) is setigerous.

The non-bulbiferous forms are all red-stemmed and, unlike the parent, are of a golden green colour usually peculiar to plumose forms; these are mostly cruciate although none are identical with the parent. One form (Fig. 4) has the upper pinnules twice as long as the lower, whilst another non-cruciate form has retained the long slender pinnae and polydactylous cresting (Fig. 5), the pinnules being fan-shaped.

It has yet to be seen exactly how many of these varieties remain constant and, in particular, the bulbil forms which may take some time to settle down owing to their somewhat unusual mode of growth.

The 'Plumosum superbum Druery' progeny, however, are a different story. These have grown exceedingly well and now have 9 inch fronds — quite amazing considering that, as I write, the plants are not yet one year old, although, to be fair, they were grown in gentle heat throughout the winter, the usual dormancy period obviously not being applicable in this case. The parent plants have grown better than ever this year and are quinquepinnate in parts with bulbils much in evidence. These are in association with spore-heaps as well as in the axils of the pinnae, and Druery himself refers to this phenomenon occurring on several plumosums with 'Divaricatum' being referred to most frequently. (See *The Book of Br. Ferns,* p.104.) The bulbils are clearly visible to the naked eye, but only on very close inspection and, being on the underside of the fronds, cannot be



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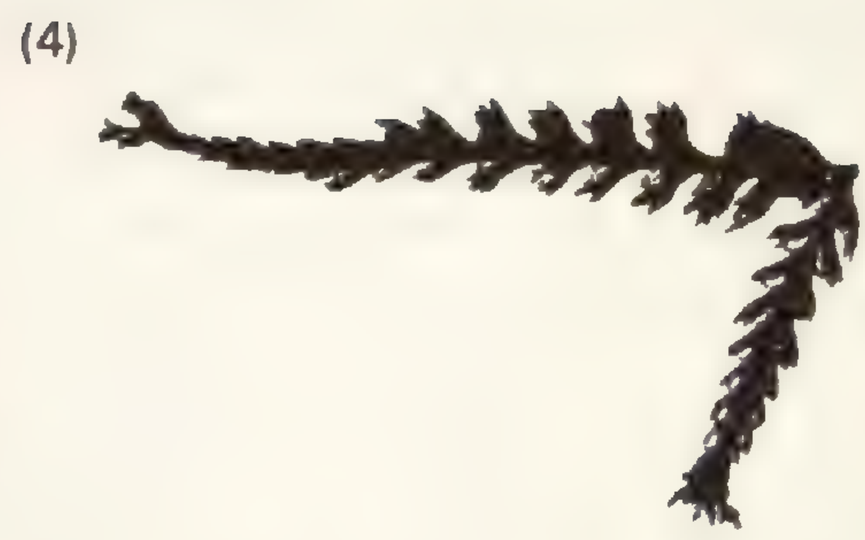

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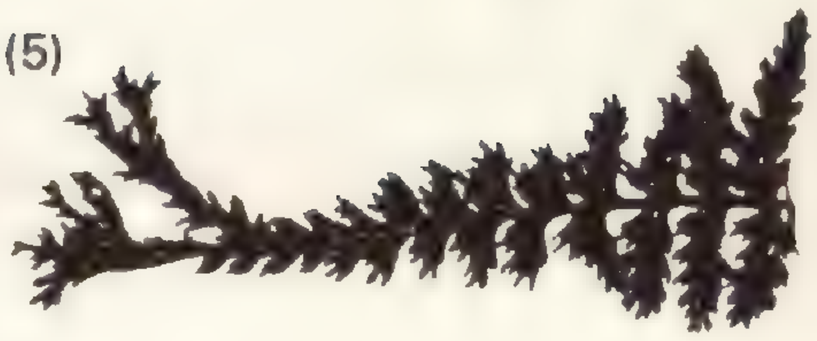

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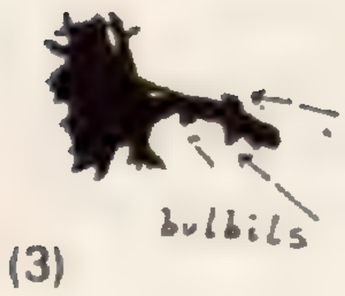

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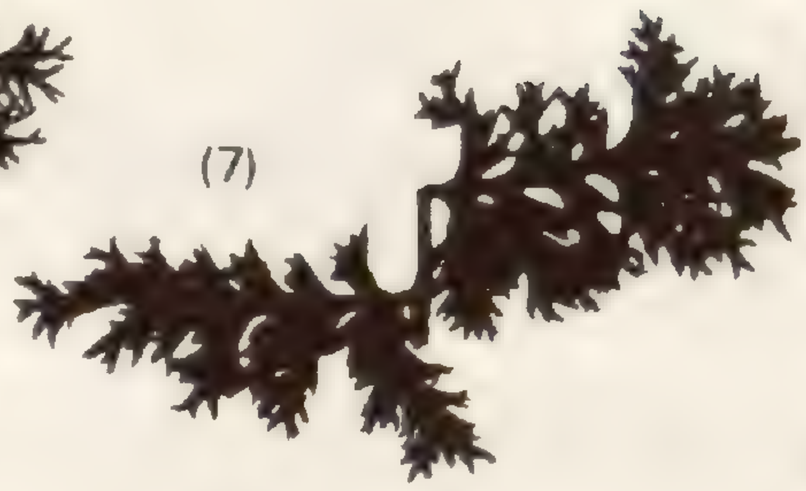


(7)

5mm

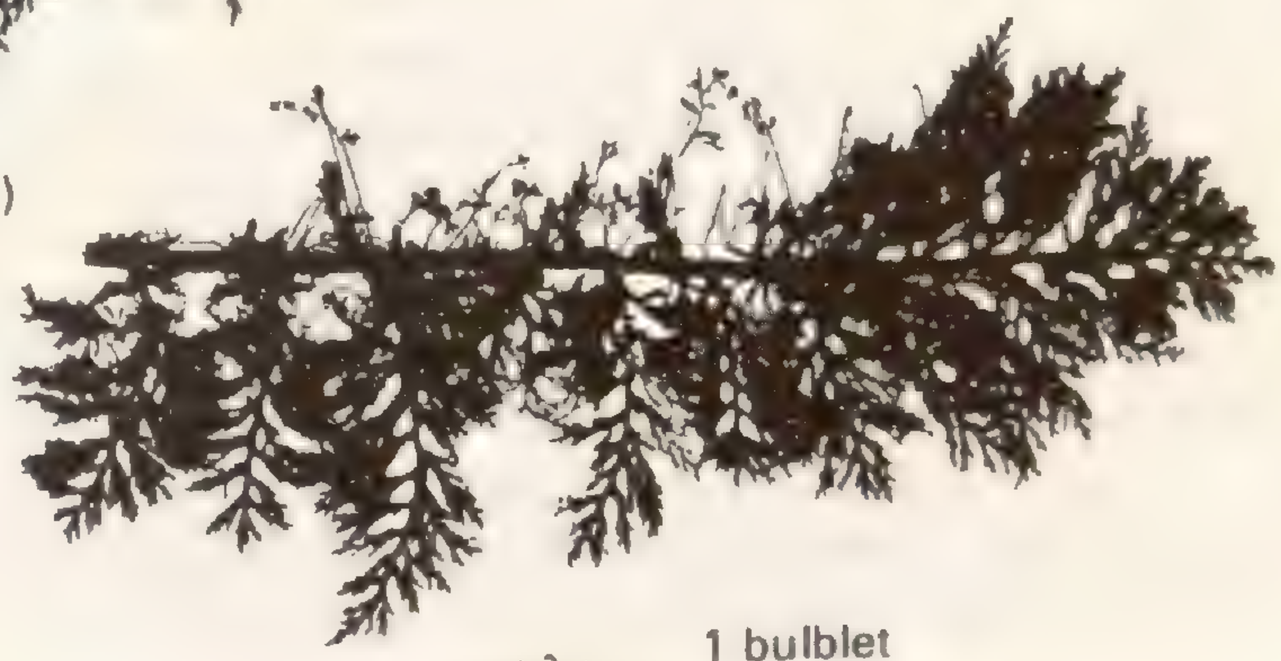
Bulbiferous lady ferns and progeny.

(1) Progeny of *Athyrium filix-femina* 'Victoriae' form, form grown from bulbil on prothallus (frond).
(2) Partly cruciate 'Victoriae' progeny raised from bulbil (frond).
(3) 'Victoriae' progeny, dwarf form (frond). (4) 'Victoriae' progeny (pinna).
(5) 'Victoriae' progeny non-cruciate form (pinna).
(6) 'Victoriae' progeny, fimbriate form grown from bulbil on prothallus (small frond).
(7) 'Victoriae' progeny, dense overlapping form raised from bulbil (mid-frond pinnae).
(8) 'Victoriae' progeny, setigerate form (frond).

(9)

(10)

(11)



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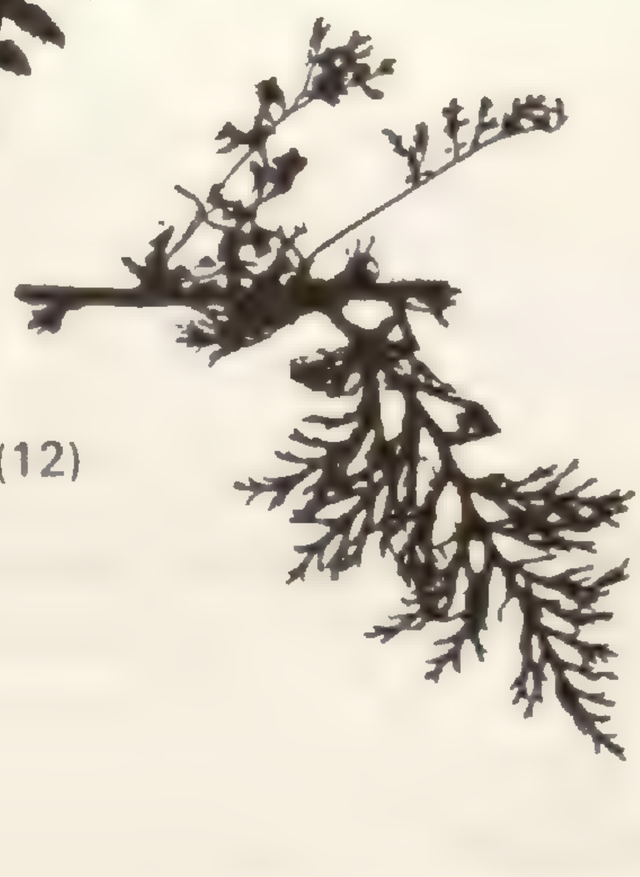
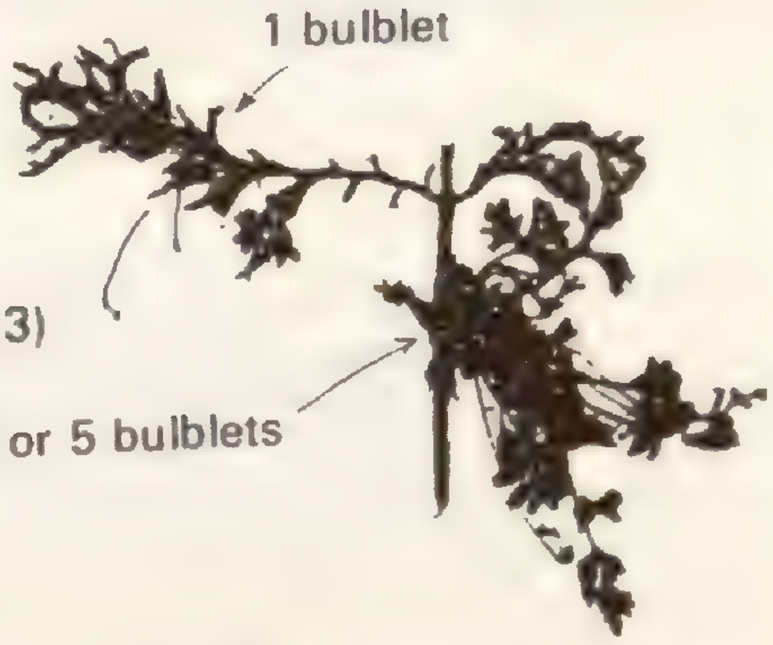


1 bulblet

(13)



4 or 5 bulblets

(14)

cluster of bulblets

bulbil on frond of bulblet

5mm

(9) *Athyrium filix-femina* 'Plumosum superbum Druery', not a frond but a single pinna showing development apparently needed to induce bulbils.
(10) *Athyrium filix-femina* 'Victoriae' form, the parent of the forms discussed in article.
(11) *A.f.* 'Plumosum superbum Druery', pinna from mid-frond stripped to show numerous bulblets. This pinna alone has upwards of 50 bulbils.
(12) *A.f.* 'Plumosum superbum Druery', base of pinna stripped of pinnules showing large plantlets.
(13) *A.f.* 'Victoriae' form showing cluster of plantlets growing from bulbils just below basal pinnae.
(14) *A.f.* 'Victoriae' form, portion of a small frond grown from a bulbil; a cluster of bulbils has developed and incredibly a tiny frond has produced yet another bulbil — seemingly an endless progression!

compared with, say, *Polystichum setiferum* 'Divisilobum'.

Fronds should be layered in early Autumn in gentle heat. I use a Sankey 14 watt propagator which can be filled directly with compost or trays placed therein. I find it preferable to place thin glass directly on top of the frond which should be upside down as this ensures that the pinnae are pressed directly on to the compost and also increases the humidity to encourage further growth. When this becomes apparent, the glass should be removed and a 50/50 mix of dry peat, dust and fine sand should be gently shaken over the front surface; I use a kitchen sieve for this (hence the need for dry peat). The tray is then misted with a hand sprayer to moisten the peat, the whole operation being repeated as many times as deemed necessary to ensure the tiny plantlets are in close contact with the compost.

When roots begin to form, and I find it takes about 10 weeks, the now 1½ inch fronds can be left undisturbed for the rest of the winter, the gentle heat ensuring growth is continous until spring when the plants can be teased apart and potted up.

In theory, all 'Superbum' plants in cultivation must be capable of producing bulbils, each being part of the original clone, the deciding factor obviously being the growing conditions available (see Figs. 9, 11, 12). As far as I am aware, my plants are grown in perfectly normal conditions in prepared beds, the shade being provided by an array of fruit trees directly overhead. Falling fruit becomes a menace in autumn and many windfalls are left to decompose where they fall and are hoed into the soil during winter. So, apart from this, my growing is perfectly 'the norm' — unless an annual plum and apple mulch is the answer!!

THE DECEMBER GARDEN

MARTIN RICKARD
The Old Rectory, Leinthall Starkes, Ludlow, Shrops. SY8 2HP

In mid-December most gardens are probably approaching their lowest ebb. Short of a covering of snow things could hardly be worse; frosts have already killed most of the autumn colour, while gales have snapped fragile stems and the earliest bulbs have not yet come up.

Nevertheless, there really *are* a surprisingly large number of plants in good form during this season. Many have been described in great detail in several books (e.g. in *Colour in the Winter Garden* by Graham Stuart Thomas), but for me pride of place must go to the winter green ferns.

The supreme example is the Polypody and its many excellent varieties, notably *Polypodium australe* 'Cambricum' (several forms), *P.a.* 'Pulcherrimum', *P.a.* 'Semilacerum', *P.a.* 'Cristatum', *P. interjectum* 'Cornubiense' and *P.i.* 'Bifido-grandiceps'. The fronds twist during severe frost but soon straighten out and regain their full stature as the temperature rises above freezing. The polypods survive like this right through the winter, finally dying back in May or June. Most Shield Ferns (*Polystichum*) and Hart's Tongue (*Asplenium scolopendrium*) also retain their summer form during these early winter days, raising their fronds above the dead ones of surrounding Lady Ferns (*Athyrium filix-femina*) and Male Ferns (*Dryopteris filix-mas*) to make a striking contrast. Particularly good are *Polystichum aculeatum, P. setiferum* 'Divisilobum' (most forms), *P.s.* 'Plumoso-multilobum', *P.s.* 'Plumosum Bevis' and progeny, and various dwarf forms, but not the larger-fronded foliose types as they tend to snap in the autumn winds,

Polystichum lonchitis is also excellent, while the related *Cyrtomium fortunei* can survive well out of the wind. *Asplenium scolopendrium* 'Crispum', *A.s.* 'Golden Queen', *A.s.* 'Ramocristatum' and indeed most other Hart's Tongue varieties also do well.

Other ferns still attractive at this time are the dwarf Aspleniums and the Maidenhairs — *Adiantum venustum, A.x. mairisii* and *A.x. tracyi,* although these will soon succumb to winter. The dwarf *Blechnum penna-marina* (in its many forms) and *B. spicant* and its varieties should however last longer.

All the ferns mentioned so far are, therefore, good plants for the December garden — as long as the fronds have not been flattened by snow or gales. But which are the dead types? Surprisingly, there are not that many. The most obvious are the Lady Ferns, *Dryopteris filix-mas, D. oreades, Cystopteris spp.,* Oak Fern, Beech Fern, Mountain Fern, the Osmundas and some other odds and ends. In effect, therefore, we are talking about a good proportion of garden ferns remaining green and in good shape well into winter.

Ferns are, of course, not alone as excellent plants for the December garden. There are many fine evergreen and variegated shrubs, e.g. hollies, dwarf conifers, ivies, rhododendrons, camelias and many hebes, particularly the smaller leaved, hardier types, and for the first time this year I'm even trying *Lomatia ferruginea* for its fern-like leaves, although this may be a bit optimistic in my cold alkaline garden!

Some shrubs even manage to flower in December, eg. *Mahonia bealii,* some heathers, *Viburnum x bodnantense, V. farreri* and *Lonicera purpusii.* It has been said that shrubs and ferns do not mix; perhaps that is right, but I feel they make a good backdrop and provide shelter, so they might as well earn their keep through into winter where possible. The bark of many trees also produces a good background for herbaceous areas; notable examples are birches, acers, especially the coral red of 'Senkaki' and the shaggy brown of *A. griseum,* the reds and yellows of some *Cornus* species and the subtler greens of some willows.

Herbaceous plants themselves can also provide a good foil for the ferns and shrubs, principally, of course, the hellebores. In December most *Helleborus orientalis* types are not yet at their best, but *H. foetidus,* especially 'Wester Fisk', *H. corsicus, H. niger* and *H.x. sternii* are often already in flower. These can be enhanced by the foliage of the autumn flowering *Cyclamen hederifolium* plus, perhaps, the odd flower of *C. coum,* together with variegated irises and phormiums, the leaf rosettes of *Meconopsis nepalensis* and the fresh mottled foliage of *Arum italicum* 'Pictum'. There may even be a few flowers on some of the earlier varieties of primrose.

While not a conspicuous feature of the garden at this time, the promise of things to come is one of its greatest assets. The flower buds swelling on witch hazels, *Corylopsis spp.,* camelias and winter flowering cherries, the first signs of snowdrops breaking the surface and next year's croziers bulking up at the heart of the crown-forming ferns, all make a tour of the garden a pleasure on a mild December day.

Of the non-fern plants mentioned above, in my opinion cyclamen are possibly the best complement to the fern garden, closely followed by *Helleborus orientalis,* but given sufficient space most are suitable. I have my reservations about snowdrops, however; they look fine in flower but the foliage eventually becomes very rank and rather messy.

In this note I am not trying to claim that ferns are at their best in December; however, I do believe they are valuable at this time, along with a wide range of flowering plants. There is therefore no reason why the December garden should lack interest even if it is without the style and comfort of August.

BULBIL PRODUCTION ON LADY FERNS

J W DYCE
46 Sedley Rise, Loughton, Essex IG10 1LT

Searching through Druery's Press Cuttings recently for certain information I was brought to a sudden stop. The paper by Vic Newry under the above title in the last issue of the *Pteridologist* interested me greatly, and here was Druery writing at length on the same subject in the gardening press in December 1882 —

> "In a batch of young ferns raised from spores provided by Mr P Neill Fraser of Edinburgh, two distinct forms of *Athyrium filix-femina* have appeared this season (1882) presenting the abnormal characteristics represented in the accompanying figures.
>
> In Fig. 1 the *first* frond evolved from the prothallus, besides being bipinnate and very foliose instead of having the usual uni-palmate form peculiar to seedlings of this family, bore two buds, one in the axil of a pinnule, the other in the axil of a pinnulet. The buds without any dormant period developed at once small palmate fronds and *aerial roots,* the growth being so vigorous that the roots were projected into a mound of soil raised at a distance of half-an-inch. The second frond produced bears four buds which are, however, dormant, the growing season being over. In addition to these axillary buds there is a whitish mass of apparent bud formation in the crown of the caudex at the base of the risen fronds. The same prothallus has also developed three small independent ferns from its edge; these, however, are seemingly normal, which fact, coupled with the abnormal vigour of the main plant, points to hybrid origin of the latter.
>
> In Fig. 2 we find an altogether different form, very depauperate and ramose. The two fronds of this have developed no less than thirteen buds of which the majority have evolved aerial roots, one reaching and penetrating the soil. The buds in the first frond have thrown up circinate fronds which have so far not unfurled.
>
> The family of *Athyrium,* rich as it is in variations, has so far been remarkable for its non-proliferous nature. I have failed to find any record of a bulbil-bearing form. It is therefore singular that two forms so distinct in character, yet so alike in their proliferousness, should have originated simultaneously, and within a few inches of each other.
>
> Finally, not the least singular feature is the extreme precocity of both forms, since bulbil-bearing ferns almost without exception are proliferous only on their ripe fronds, and when much further advanced in development."

The press cutting does not name the journal in which this article appeared, but later in the same month it was followed by a further article by Druery on the same subject in the *Gardeners Chronicle,* dated 22 December 1882 —

> "On November 2 1882 I exhibited at the Linnean Society two forms of *Athyrium filix-femina* which, at a very early age — on their first fronds, in fact — bore, in the one case several, and in the other case numerous proliferous buds in the axils of the pinnae. Enlarged representations of these plants were given in your journal of December 16, accompanied by a description and observations bearing upon the extreme rarity of such phenomena in the genus *Athyrium,* of which, indeed, at that time no record appeared to exist, though I have since learned that Mr Mapplebeck had observed bulbils on young *Athyria* of the *uncum* strain, and had even raised plants from them, which, however, apparently ceased to be proliferous at a more advanced stage. Regarding the plants of my raising, therefore, it may interest your readers to learn that while the first form discovered has ceased to develop bulbils,

though several plants have been reared from those at first produced, the second form found has yielded this season numerous bulbils on its spring fronds, but none on its later ones — its very first fronds persisting, singular to say, through the winter in my fernery whence the frost is just excluded and, resuming growth in January, the pinnae forking anew dichotomously several times, producing numerous bulbils on the fresh growth. The small plants raised from this fern are fully as proliferous as the parent, all the pinnae being dotted here and there with bulbils.

Fig. 1.

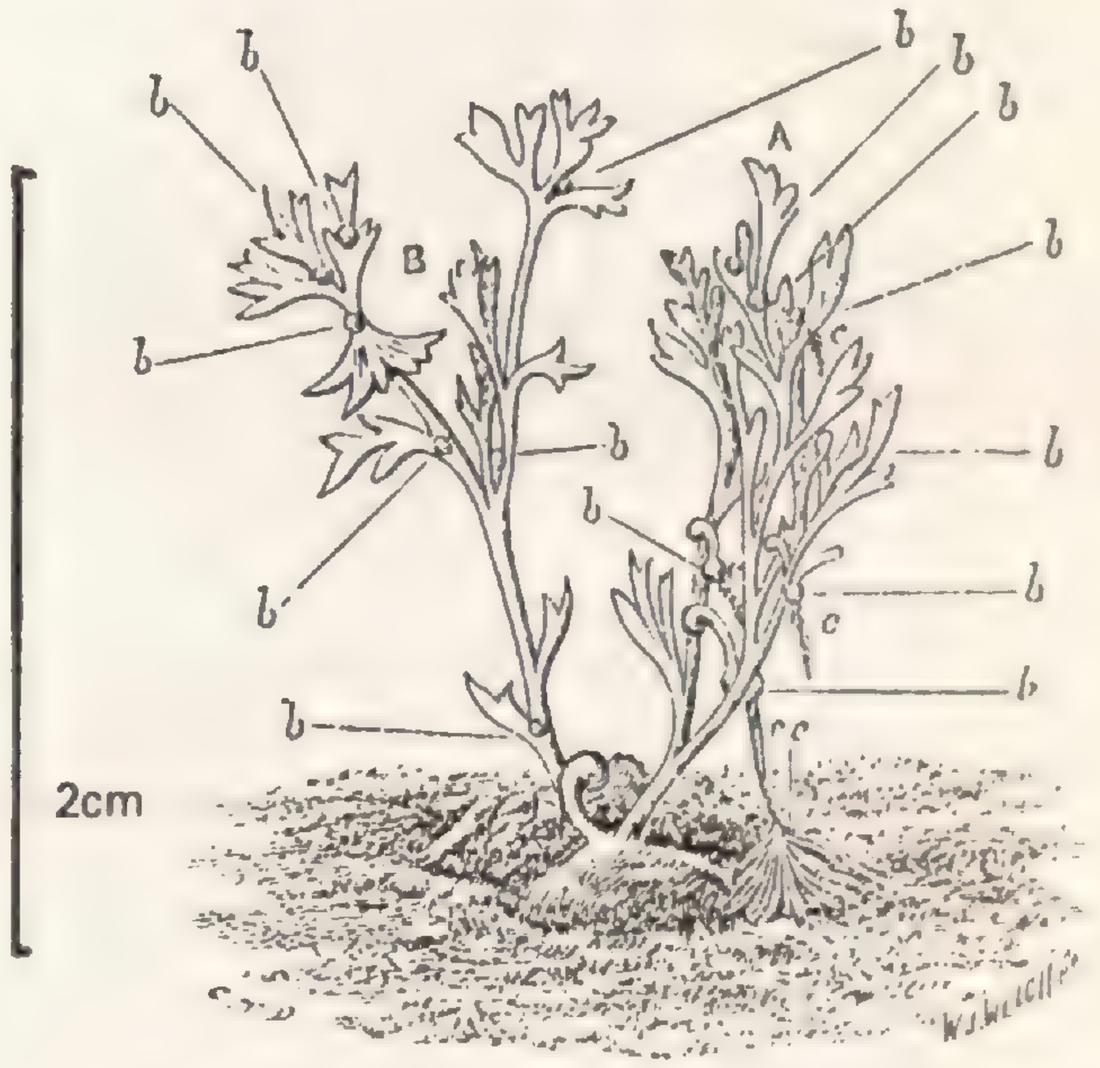


Fig. 2.

Fig. 1. Proliferous fern sporeling. A, first frond; B, second frond, p,prothallus; bb, frond of second generation; c, independent ferns developed from same prothallus. The two bulbils on A have sent out aerial roots, reaching and entering the soil.

Fig. 2. Proliferous fern sporeling. A, first frond; B, second frond; b, bulbils; c, aerial roots; cc, root entering soil.

Fig. 3.

Fig. 3. Bulbil of *Athyrium filix-femina* 'Plumosum divaricatum', highly magnified.

My chief object, however, is to place on record the existence of this proliferous character in the same section, but in another and more unexpected direction, viz., amongst the plumose varieties, and this, too, on old full-grown plants. On September 18 this year, while examining a large specimen of *A.f-f.* 'Plumosum divaricatum', bought in 1881 of Messrs. Stansfield, I was struck by the fact that in the place of sori, for which I was searching, the under-surface of the pinnae was studded profusely with minute nodules surrounded shuttlecock fashion by scales. Applying a lens I found the central excrescence to be roundish and of a brilliant green, while the scales were of a symmetrical lanceolate shape and beautifully reticulated (Fig. 3).

My immediate impression was that they were bulbils but this, nevertheless, seemed more unlikely as, to my knowledge, no fern, British or exotic, had been known to produce them on the under-side of the fronds and in the centre of the

pinnae. I, however, determined to try the question, and laid down several pinnae, under-side uppermost, on sandy soil, dredging coarse silver-sand over them to keep them flat, and washing this off again sufficiently to expose the presumed bulbils to the light, the result being that on October 31 I was able to report to Mr G B Wollaston that their bulbil character was established, since in one case a frond with three pinnae had arisen, and in many cases the circinate form was evident. In reply to this announcement Mr Wollaston informed me that my discovery had been anticipated, though only by some weeks, since on September 6 he had seen a plant of *A.f-f.* 'Plumosum elegans', a seedling of the Axminster variety, in the possession of Mr Carbonell, Usk, upon which similar bulbils had been discovered this season. He added, however, that so far no signs of development had been visible and that, to the best of his belief, I was the first to raise plants. On a subsequent visit of Colonel Jones, however, minute fronds had appeared, as upon my plants.

From Colonel Jones of Clifton I have received the following additional information which has, so far, I believe, not been formally recorded and which, taken in conjunction with the recent discoveries of proliferousness on other varieties of *Athyrium,* certainly merits it. Mr E J Lowe, he informs me, noticed some twenty years ago similar bulbils on the Axminster plumosum but, owing to the lateness of the season, failed to raise detached plants, though they appeared to attain some size while still adherent; and so far the difficulty of establishing them independently seems to have been insurmountable. From the appearance, however, of my young plants I cannot think that it will long remain so.

As the matter now stands this viviparous character has been found upon four different forms, viz. *A.f-f.* 'Plumosum Axminster', by E J Lowe; *A.f-f.* 'Plumosum elegans Axminster' (Parsons), by Mr Cropper; *A.f-f.* 'Plumosum Stewardson', by Mr Stewardson; and *A.f-f.* 'Divaricatum', by the writer."

ASPLENIUM TRICHOMANES 'BIPINNATUM ROBERTS'

J W DYCE
46 Sedley Rise, Loughton, Essex

For some strange reason this very remarkable and unique variety of *Asplenium trichomanes* never made the headlines in the fern press although it is a break unusual enough to havè attracted wide-spread attention. Druery dismisses it in a very few lines in his *British Ferns and their Varieties* and there is no illustration. No mention is made of it at all in his voluminous writings to the press and gardening journals and we are left with only the short article by Dr F W Stansfield, which appeared in the *British Fern Gazette,* Vol. 7, number 3, dated December 1936, with its frontispiece which is reproduced here, as a sole record.

The original plant was a wild find in North Wales by Ellis Roberts, but when it was found we do not know, nor have we any information about the finder. His name does not appear in any of our published membership lists. However, he was obviously known in the fern world and sporelings from his find were distributed by him. Seemingly, Dr Stansfield first came to know of it from the sight of a frond sent to Druery by E J Lowe. The Doctor would not commit himself definitely in his article but as far as he remembered — obviously writing at a much later date in 1936 — the frond was 16 to 18 inches long and 5 to 6 inches wide, and thoroughly bipinnate throughout.

Asplenium trichomanes 'Bipinnatum Roberts'

Shortly afterwards, on a visit to his brother Herbert Stansfield at his Sale fern nursery, he found a large batch of sporelings of what was evidently the same fern but much smaller, with the bipinnate character showing only intermittently although the pinnae throughout were longer than normal.

Dr Stansfield was never able to grow the fern to the size of Lowe's frond, but his plant which he possessed for several years, given to him by our early Lakeland member, George Whitwell, retained its bipinnate character constantly, although the sporelings were small and very irregular.

It seems that members who were most successful with the variety were J Sheldon of Great Bookham in Surrey and Robert Bolton of Birdbrook in Essex (the grandfather of our present Robert Bolton). Sheldon's plants were thoroughly bipinnate, but his results were surpassed by Bolton's, whose recipe for success was liberal culture from the start and growing on the young plants from the spore pan without any checks. The frond which I reproduce here came from one of Bolton's plants.

Why was there so much mystery about such an unique fern variety? We don't know Roberts, we don't know where in North Wales he found it, nor when he found it — no date is mentioned anywhere, and we don't know why Druery was so silent; we can imagine his pen working overtime, spreading the good news around! We can only thank Dr Stansfield for "breaking the silence" and letting us know that such an unusual fern DID exist and *could* turn up again in the wild. Could it still be around tucked away in some old fernery? It would be exciting to re-introduce it to our present-day growers.

TRACING A FERN

RAY BEST
15 Orana Road, Kenthurst 2156, New South Wales, Australia

At a gathering of a local fern group I was shown an unusual fern which I was unable to identify. I requested a fertile frond, which was immediately supplied along with a small growing specimen. So I felt in duty bound to see what could be done about tracing its identity. I was told that the fern was widespread in swampy conditions in Queensland. The story is compiled with some help from the Editor and Dr R.E. Holttum.

I first found an illustration of the fern in E.J. Lowe's *Ferns, British and Exotic, Vol. 6* (1857), p.121, pl.47 under the title *Aspidium unitum* Schkuhr, with the statement that the species was introduced to cultivation at the Royal Botanic Gardens, Kew, in 1793. Schkuhr, who worked at Leipzig and published the first series of illustrations of ferns, based his name (1804) on *Polypodium unitum* Linn. (1759). The first record of the species in Australia was made by Robert Brown (1773-1858). Brown accompanied Matthew Flinders (originator of the name Australia) on his voyage of 1801-1805, during which the whole Australian coast was charted. Brown made large collections of plant specimens, which formed the basis for his work *Prodromus Florae Novae Holliandiae* (1810), the foundation of Australian botany; he named the fern *Nephrodium unitum.* John Smith, Kew's first Curator, published in 1866 his book *Ferns British and Foreign,* which included a list of more than 1000 species which he had seen in cultivation, among them *Nephrodium unitum.* In his *Lithrograms of the Ferns of Queensland* (1892) Frederick Manson Bailey illustrated our species under the name *Aspidium unitum.* The generic names *Aspidium* and *Nephrodium* were confusedly used by different authors with different meanings in the 19th century; both have now been abandoned.

In the 20th century two developments affected the fern named *N. unitum* by Brown. First, Christensen showed that characters ignored by 19th century botanists distinguished a large group of ferns, including *Thelypteris* Schmidel (1763), from *Aspidium* proper. He studied the ferns of this group in the Americas; those of Asia were first distinguished by R.C. Ching, who established the new family *Thelypteridaceae* in 1940. In so doing Ching revived the genus *Cyclosorus* Link (1833) which was based on the species *Aspidium gongylodes* Schkuhr (1809). Schkuhr based this name on a specimen from Guiana which he thought distinct from the Indian one which he had described as *A. unitum,* but Ching regarded them as conspecific. Holttum, in his book on the ferns of Malaya (1955 followed Ching's generic concepts and also accepted the name *C. gongylodes.*

The second development resulted from an examination of the specimen of *Polypodium unitum* in the herbarium of Linnaeus. This specimen is quite distinct from that described by Brown as *N. unitum,* though Linnaeus cited other descriptions which certainly do correspond with Brown's. Accepting the Linnean specimen as defining the meaning of the name *P. unitum,* another name had to be found for our species. The first such name was *Pteris interrupta* Willd. (1794); the specimen is at Berlin, and unfortunately Ching misidentified it, with the result that the name *Cyclosorus interruptus* in Holttum's book refers to another species.

When writing his book on the ferns of Malaya, Holttum discovered that Ching's generic concepts, based on ferns of mainland Asia, were not satisfactory for the much greater diversity of species in the Malayan region. So in the years 1968-1980 he made a detailed study of all known species of the family *Thelypteridaceae* in Asia, Malesia, Australasia and the Pacific, examining and re-describing the types of more than 500 species. As a result he proposed a new set of generic concepts, some with new names; these genera are listed in the paper by Crabbe, Jermy and Mickel in the *Fern Gazette* vol.11, pages 141 onwards (1975). Holttum published a full account of Malesian species in Flora Malesiana, *Series II, Vol.1,* pages 331-560 (1981), and those from Australasia and the Pacific in

Fig. 1. *Cyclosorus interruptus* (Willd.) H.Ito.
a) Lamina b) Fertile pinna (enlarged) c) Stipe section (enlarged) d) Scale (enlarged)

Allertonia, no. 3 (1977, published in Hawaii). Jones and Clemesha, in the second edition of their book on Australian Ferns and Fern-allies (1981) adopted Holttum's names from the latter work, as follows:

Nephrodium unitum sensu R.Br. = *Cyclosorus interruptus* (Willd.) H.Ito.
Polypodium unitum Linn. = *Sphaerostephanos unitus* (L.) Holttum.
Cyclosorus interruptus sensu Holttum 1955 = *Amphineuron terminans* (Hooker) Holttum.

SHORTER NOTES

Osmunda regalis on Sedgemoor

The royal fern has been recorded for Sedgemoor as long as botanical records have been kept. Over recent years an increasing quantity of peat has been extracted from the Somerset levels, and standards of drainage improved to aid various forms of agriculture. The water level in the few remaining reserves has been drastically lowered as a consequence of this work, resulting in the demise of the moisture loving royal fern in many of its habitats.

One good site for this fern is Shapwick Heath, a nature reserve composed of birchwood and peaty meadows, now owned by the Nature Conservancy Council. In the last few years it has been noticeable that all the *Osmunda regalis* have remained a similar size, with no new plants under 10 years of age. During the last two years a powerful pump and large bore pipe of approximately one foot in diameter have been installed, and a number of tributary ditches dug allowing water to reach all areas of the birch woodland. The result of this work by the NCC has been to raise the water table, and lastsummer osmunda snorelings and prothalli sprung up along the edges of the cultivars and rhymes. It is good to know that this handsome fern is regenerating in this favoured locality, and, owing to the recent wet summers, in various other reserves on Sedgemoor owned by the Somerset Trust for Nature Conservation.

MARY POTTS

B.S.B.I. Monitoring Scheme

In the 25 years following publication of the *Atlas of the British Flora* (Perring & Walters, 1962), there have been many changes in the countryside of Great Britain and Ireland, and up-to-date information is urgently needed on much of the wildlife. The Botanical Society of the British Isles (B.S.B.I.) has therefore set up a new recording scheme to assess the current status of the British and Irish flora, and also to provide a means of monitoring further changes in the future. During 1987 and 1988, the flora of a sample of 10km squares throughout the country (one in nine on a grid basis) will be surveyed to give an objective assessment of the species which have changed in distribution and/or abundance since the *Atlas,* and within each of these selected 10km squares, three tetrads (2 x 2km squares) will be surveyed in detail to establish a baseline for monitoring future changes.

There are two parts to the scheme; species recording and habitat survey. All native and introduced vascular plant species occurring within the selected 10km squares and tetrads will be recorded, together with details of rare, critical and the more notable species. The habitat survey is optional, and will be used to provide information on habitat distribution and composition to parallel species data. Discrete habitat units (i.e. distinct areas or vegetation types) will be selected and notes made on the plants and other habitat features. Only records for 1987 and 1988 will be accepted so that a clear "snapshot" of the flora is obtained.

The Monitoring Scheme is being run from the Biological Records Centre, Monks Wood, and is being funded by the Nature Conservancy Council. We would be interested in any records made in the selected squares during the next two years by competent botanists, and anyone wanting to contribute or requiring further information should contact me at: Biological Records Centre, Monks Wood Experimental Station, Abbots Ripton, Huntingdon, Cambs. PE17 2LS. Phone: Office hours: Abbots Ripton (04873) 381 or evenings/weekends: Peterborough (0733) 49398.

T.C.G. RICH

Not a tropical jungle! *Dicksonia antarctica* in Trengwainton Gardens, Cornwall
(Photograph by Christopher Potts)

Osmunda regalis croziers, Sedgemoor, Somerset
(Photograph by Christopher Potts)

Asplenium scolopendrium 'Cristatum Jackson'

Cheilanthes maderensis
Canary Islands

Notholaena marantae
Canary Islands

SHORTER NOTE

My finest wild find

This fern was found in some disused sandstone-cum-limestone quarries in the village of Brigham near Cockermouth, Cumbria. I had a friend in the village who knew I was keen on ferns, and knowing there were a lot in the old quarries he invited me down for the weekend. We explored the area and found plenty of ferns especially scollies — with short, broad or long, narrow or intermediate fronds. At the foot of an old wall I spotted a small plant with one or two fronds showing signs of cresting, which I thought might have some potential. As it grew older the cresting developed, exceeding my wildest dreams — as seen in the photograph opposite.

FRED JACKSON

(Many years later, 1980, Fred led a party of BPS members to this quarry only to find it was gradually being filled in. We were fortunate, however, that we found one or two more crested scollies at the far end. These were rescued and have made fine garden plants indistinguishable from Fred's original. It is a splendid addition to the fern border — *Asplenium scolopendrium* 'Cristatum Jackson'. Ed.)

FERNS IN THE SUN

BARRY A. THOMAS
Department of Botany, National Museum of Wales, Cardiff

The Canary Islands, situated between 27°31′ and 29°23′N and approximately 65 miles off of the west coast of Africa, provide a fascinating mixture of plants and plant communities for any visiting botanist. The Islands are mainly of volcanic origin which was initiated in the late Cretaceous and persisted through to historic times. This has given high peaks and mountain ranges that trap the rain-bearing clouds circulating in the Atlantic. The climate, together with geographic isolation, has left these islands with many relicts of the rich flora that once spread throughout the mediterranean region. Since then, evolutionary change has led to newer island endemics. Here and there persist remnants of the Laurel forests (the Laurisilva) that once covered most of the middle slopes of the islands, from about 1,500 to 3,000 feet between the lower mixed forests and the higher *Myrica faya-Erica arborea* (Fayal-Bezel). The Laurisilva is especially important to pteridologists as it is maintained by the almost constant cloud layer that encircles the islands. In contrast to these rain-soaked forests there are many areas of low rainfall, ranging from the more southerly coasts of the larger islands to the desert conditions on Fuetoventura and the south of Lanzerote and the high, 6,000 ft central calderra in Tenerife.

There appears to be an almost endless range of habitats for the visiting botanist/pteridologist to explore, and a selection of ferns to be found that offers both familiar and unusual species to those of us more accustomed to north-western Europe. A number of people have given accounts and lists of the species of Canary Islands pteridophytes (see Page in *Fern Gazette* 11(5), 1977 for references). In two weeks on Tenerife I managed to find 18 of them, while one day on El Hierro gave 13 including *Cystopteris diaphana* and *Ceterach aureum* that I did not discover on Tenerife.

The prime area on Tenerife for pteridophytes is the northern tip of the island in the high Anagar mountains where the best Laurel forest remains. The road from the University town of La Laguna to El Mercedes and on to Cruz de Carmen and El Bailedero gives direct access to the area and offers breath-taking views from nearly 6,000 feet down on to the

cloud-covered steep-sided to near vertical wooded slopes (sometimes on both sides of the road!). However, as Page has recently described the fern communities to be found in these evergreen cloud zone forests, I will not dwell on them any further, but I will concentrate on the drier regions of Tenerife, where we might not expect to find very many ferns. Indeed we went here as much to escape the clouds and rain and to see the sun as to look for plants.

The most extreme hot conditions are found in the central calderra of the volcano El Pico. This is the driest region of the island where virtual desert conditions prevail. I found no ferns here at all and instead I had to make do with looking at unfamiliar spiney shrubs and the dried remains of last year's giant Echiums. Even outside of the central calderra there are many very dry areas but *Polypodium macronesicum* and *Davallia canariensis* are two species that can be found almost throughout Tenerife even spreading into such areas of quite low rainfall. They can even be found in areas of quite high summer heat, when both species loose their leaves to survive the drought as rhizomes growing deep in rock or wall crevices.

On the south eastern slopes leading down from the central volcanic calderra the higher regions are still covered with *Pinus canariensis* growing in between the large blocks of lava. Here in between these blocks and sometimes growing on them were also numbers of *Notholaena marantae* and *Cheilanthes pulchella.* Such areas as these are virtually worthless for cultivation and have been left, but further down the slopes agriculture is possible especially through the creation of walled terraces. The lower regions of these slopes must therefore have been cleared of trees for a long time with many of them having been cultivated for the sparsely grown olive trees. *Notholaena marantae* persisted here growing alongside the roads and sprouting from crevices in the surrounding rocks.

Further down the mountain the ground seemed very dry indeed with water being brought in by means of concrete culverts, so at first sight it appeared to be quite unsuitable for ferns. However I was very pleasantly surprised, for there were ferns here in quite large numbers. *Notholaena marantae* was here again although the smaller size of the fronds and the more golden yellow colour of its scales suggested that it might be a different variety (var. *cupripaleacea*) to the other more common form (var. subcordata). *Notholaena vellea* and *Cheilanthes pulchella* were also growing quite happily in cracks, crevices and even in areas of exposed rubbley loose lava. All three species were clearly thriving in the baking heat with their rhizomes growing under the baking hot surface and their thick upper surfaces and scaly lower surfaces helping to prevent undue water loss. In extreme conditions they roll up their fronds as does our more familiar rustyback fern *(Ceterach officinarum).* If these conditions persist for any length of time the exposed rolled up fronds eventually die but remain standing up as though still alive. *Ceterach aureum* is another species with a dense covering of scales on its undersurface, but I failed to find it on Tenerife. Instead I found it on El Hierro where it was growing with the larger form of *Notholaena marantae* in crevices on north-eastern facing cliffs at about 1300m above sea level. Page has described all these species as occurring sparsely and widely scattered in crevices and on exposed rock ledges in the cloud forest region. It therefore seems most likely that their preference for such drier and more exposed conditions saved these few species when the forests were cut down. The number of potential habitats increased rather than decreased and the species spread. In contrast the species which grew on the damp forest floors in the shade of the trees all died.

Cheilanthese maderensis appears to be yet another rock crevice fern that survived the move from forest conditions into the open areas of cultivation. Although there was no sign of this species in either the pine forest or the olive grove areas, I did find it in the dry south eastern region growing on a rocky outcrop about a mile south of Santiago de Teide. This species has a more restricted habitat than the others, perhaps lacking the ability to exploit the open dry areas.

Although the cloud forests in the north west of Tenerife might happen to have a much greater and more varied population of pteridophytes, not all of them are restricted to this area. There are ferns in the drier areas so it is possible to look for them on the island while sunbathing at least some of the time. Double pleasure!

BOOK REVIEW

THE EUROPEAN GARDEN FLORA VOL 1 edited by S.M. Walters et al, Cambridge University Press, Cambridge 1986. 430pp. 280 x 220mm. 44 full page black and white figures, 1 map. Price £55. (Fern section edited by C.N. Page and F.M. Bennell).

This substantial book is Volume 1 of a planned 6 volume manual for the identification of plants cultivated in Europe. It aims to meet the needs of the informed amateur gardener just as much as the professional plant taxonomist. The editors have included all those species they consider likely to be found in general collections in Europe (i.e. excluding botanic gardens and specialist collections), whether they are grown out-of-doors or under glass. Volume 1 covers Pteridophytes (67pp), Gymnosperms (40pp) and a large part of the Monocotyledons (285pp). Keys are given for all groups down to species level, and diagnostic features of each species are given along with their wild distribution and a guide to their hardiness. This last point is a key feature of the book. By matching the hardiness category with the zones given on a map in the Introduction, it can be seen in which parts of Europe a given species should survive out-of-doors.

The fern section is very well presented with about 300 species included, with most illustrated. The illustrations are accurate, perhaps not attractive, but certainly useful diagnostically. (Other families in the book are not illustrated although there are illustrations showing key characters for a few groups.) The question of which taxa to include must have caused much debate among the Editors, but I wonder if perhaps they have been too broad in their interpretation of garden ferns? By including a large number of glasshouse ferns (in fact over 50%) they have come close to the edge of their prime definition of only featuring plants widely grown. Some other inclusions are also rather marginal as garden plants e.g. *Regnellidium, Marsilea, Pilularia, Ophioglossum* and *Equisetum*. On the other hand not a single British fern variety is listed. Most garden centres stock a good range of these ferns and these days they are widely grown. A comprehensive list of varieties would probably be impractical here, but a mention of some of the more well known would surely have been appropriate. This omission is all the more galling when other genera in the same book (e.g. *Hosta*) have been described down to varietal level.

These are however small criticisms when looking at the fern section as a whole. This book is original and breaks new ground, it will be of immense value to gardeners throughout Europe — as long as they are not growers of fern varieties.

MARTIN RICKARD

EQUISETUM RAMOSISSIMUM IN SOMERSET

ROSEMARY FITZGERALD
NCC, Zealds, Church Street, Ashford Kent, and

CLIVE JERMY
British Museum (Natural History), Cromwell Road, London

Weston-super-Mare is a small nineteenth century *plage* on the North Somerset coast. A long promenade is fronted by acres of sand trampled by seaside donkeys, and occasionally covered at high tides by the locally notorious 'brown waves of Weston'. Behind runs a strip of very municipal turf in front of Victorian mansions converted to guesthouses, among which lurk a couple of small parks distinguished by 'ornamental' pines and battered escallonia bushes. Although this seafront is framed between outcrops of carboniferous limestone at Uphill and Worle Hill, it looks a most unpromising area for an extremely interesting collection of botanical records. One such plant is *Cynodon dactylon* which is thoroughly naturalised on the promenade lawns, and *Trifolium suffocatum,* lost to V-c 6 since its Weston-super-Mare site was built on in the nineteenth century, was rediscovered more than a hundred years later among the deck chairs, fulfilling White's prophesy "I confidently expect it to be rediscovered some day on the shores of North Somerset" (White, 1912).

In January, 1983, attention was focussed on Ellenborough Park by the rediscovery of *Herniaria glabra* by A.J. Byfield, following up a 1945 record of G. Nicols' (Sandwith, 1946) and a herbarium specimen collected by Noel Sandwith in 1946. The plant now flourishes in patches worn bare by local schoolboys football goals. Over the past 20 years the site has been much visited, and botanists noticed an odd *Equisetum* growing along the railings with *Carex arenaria, Oenothera cambrica* and *Lobularia maritima,* a species commonly naturalised in this area. The turf of the Park itself is characteristic of unimproved coastal grassland in the area, with species like *Salvia horminoides* and the annual clovers *Trifolium scabrum* and *T. striatum.*

R.F. first collected the *Equisetum* in 1983, being curious about its slender habit, striking sheath markings and small black cones. On showing it to a colleague interested in horsetails she was told it was 'an aberrant form of *E. arvense*'. Curiously enough, R.M. Burton, twenty years earlier, had also collected a specimen from here, and had been through the same process, receiving the same answer from another botanist. Only by 1986 had the plant puzzled so many botanists that interest became more intense, and more exciting determinations were suggested, including *E. x moorei* and *E. ramosissimum.* At this point material was brought to the British Museum and confirmed as the latter species by C.J. and Alison Paul. (Fig. 7).

Horsetails have an interesting history in Weston-super-Mare. Quite close to Ellenborough Park was a site well known early this century for *E. hyemale* and *E. variegatum,* both extremely rare in V-c 6. Specimens of both species exist collected by White and C. Bucknall (BRIST) between 1901 and 1906, labelled "Damp sandy field near Weston-super-mare" and "Sandy pasture by the railway station". However, there seems to be no connection with the present plant. The specimens seem to be exactly what they say they are, and the site, although threatened by building, was known until 1951 when *E. variegatum* was last seen. *E. hyemale* had disappeared earlier and was last seen in 1933 (White, 1912; Roe, 1981).

E. ramosissimum is not currently regarded as a native species and is known in the British Isles only from one site in Lincolnshire, (Figs. 1 and 2), where there is good evidence of it being an introduction. It is interesting, therefore, to speculate how it arrived in Weston-super-Mare. However respectable the turf is in the Park, 'aboriginal' or not, it must have had considerable disturbance in the past, at the time of its enclosure and the building of

Fig. 1. *Equisetum ramosissimum* from Lincolnshire, showing the slender stems formed at a damaged node.
Fig. 2. *Equisetum ramosissimum* from Lincolnshire, normal undamaged stem.
Fig. 3. Stem section of *E. ramosissimum.*
Fig. 4. Stem section of *E. x moorei.*
Fig. 5. Stem section of *E. arvense.*
Fig. 6. Stem section of *E. palustre.* (stem sections after Hegi, 1984).

Fig. 7. *Equisetum ramosissimum* Desf. from Ellenborough Park, N. Somerset.

surrounding houses, and, if Nicols' comments on his record for the *Herniaria* here are to be believed, the site was also occupied by American troops (in 1945). Some interesting work has been done on species spread by troop movements (called polemochores; Niemi, 1969) and the arrival of *E. ramosissimum* with the belongings of troops returning from the Continent at the end of the war seems much more likely than the species should have survived from prehistory in Ellenborough Park.

Chris Page (1982) does not describe *E. ramosissimum* in his book (on the grounds that it is an alien) and so a description of the plant as seen in Britain is given here. The stems may reach to over a metre in height but without support are rarely seen as such; the Lincolnshire plants tend to lie prostrate, supported only by thick grass. They are 2-7mm wide, not rough to the touch, with 1-6 branches at each node except for the lower third where they are lacking (see Fig. 2). Sheaths tend to be inflated or funnel-like, 5-20mm long, very soon becoming a grey-brown with a dark brown girdle where the sheath meets the stem. The sheath teeth are 2-8mm long with a brown centre and white margin, and soon shrivelling, leaving the brown bases around the top of the sheath. The branches are 6-angled, rough, with similar inflated sheaths. Cones are black, up to 15mm long by 7mm wide, with an obtuse or slightly apiculate apex.

Throughout its range (Eurasia and south into Africa) *E. ramosissimum* is tolerant of both sandy and calcareous habitats but is most frequent on well-drained soils. In Europe it is a Mediterranean plant reaching into central Poland (Alston 1948) and in the NW into south Holland along the Rhine valley, from where it was most likely introduced with ships' ballast that was offloaded to consolidate the seawall along the River Witham at the Lincolnshire seaport of Boston. It is however one of the parents of *E. x moorei,* a plant considered native in Co Wicklow, Eire; the other parent is *E. hyemale* (Page, 1982). It differs from *E. ramosissimum* in having stems that are almost entirely without branches and the stem ridges are sharply angled (see Figs. 3 and 4). Being a hybrid the cones are sterile. However, when trampled or cut, the branches of *E. ramosissimum* (like most species of *Equisetum*) will develop to take on the role of the main stem, and it is these more slender stems that can be confused with *E. arvense* or *E. palustre*. In both the latter species the branch sheaths are tight-fitting, the teeth black without a scarious edge. Furthermore, when seen in cross-section, the stems of these two species have much larger air (valecular) canals (see Figs. 5 and 6).

E. ramosissimum has recently been proposed for total protection under the Wildlife and Countryside Act in the Quinquennial review of species listed in Schedule 8. This will mean that the species on no account may be collected (at least without the necessary government permit) and anyone damaging any plant is liable for prosecution.

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TREE-FERNS OUT-OF-DOORS IN THE BRITISH ISLES

MARTIN RICKARD
The Old Rectory, Leinthall Starkes, Ludlow, Shrops. SY8 2HP

There can be few garden plants more impressive than well developed tree-ferns. Individual specimens or groups create a tropical atmosphere, they are a sight remembered even by non-pteridologists (see photograph opposite p.174).

I have long wanted to grow these plants but like most BPS members I live in a cold area and, as all my attempts to date have failed, I had really given up any hope of success until last year's article by Ray Best (Best, 1986) rekindled my interest. The 21 odd species he grows apparently all stand frost down to -5°C at least. Are tree-ferns, therefore, hardier than I thought, and are there more suitable species that have yet to be tried out-of-doors in the British Isles?

Before these questions can be answered the first thing to establish is just where these plants do survive, as of 1986 at least. Therefore, with the help of a large number of people (see Acknowledgements) and published records, the attached map was gradually pieced together for the distribution of *Dicksonia antarctica* in gardens, although I suspect some records may be for *D. fibrosa.* Other species are also rarely grown (see later). Obviously the distribution pattern which emerges is artificial, as it relates to gardens, but it is still clearly correlated with areas influenced by the North Atlantic Drift. Nearly all gardens where tree-ferns thrive and regenerate have fewer than 20 air frosts on average per year. Some sites appear to have between 20 and 40 air frosts, but in most of these the plants do not do so well. Another interesting point about the dot distribution is that sites with an easterly aspect near to the sea are commoner than similar sites with a westerly aspect — except in the very mildest areas. Compare north-west Cornwall with south-east Cornwall, south-west Devon with south-east Devon and east Ireland with west Wales. Also consider west Scotland where successful sites are usually either on islands or on peninsulas. This suggests that cold dry east wind in winter coming off the land is the biggest enemy of tree-ferns, although these ferns cannot thrive on the east coast of England because they also need the warmth of the North Atlantic Drift.

Other features of all these sites are a high rainfall, hence a high humidity, and fairly cool summers. Soil is acid, and successful sites are sheltered from the wind, usually in mixed woodland. All these factors can be mimicked almost anywhere, but short of growing under glass it is pretty difficult to get around the 20-40 days' frost problem inland in Britain.

The next question therefore is — is it the frost that is critical, or is it some related factor such as snow? One of the more marginal sites, Logan in south-west Scotland, has *Dicksonia antarctica* over 100 years old with trunks up to 15 feet tall. At this site temperatures down to -11.5°C were recorded during the early 1980s but mature plants survived — however many younger specimens with little or no trunk died, possibly because the air was colder at ground level. As a result it is now policy at the garden not to plant out until the fern has a trunk two or more feet tall. Experience at Logan also suggests that snow freezing *in* the crown can be damaging. Conversely though, it is known that snow *on* the crown is not always fatal. In Ireland it is believed to act as a protective blanket, and indeed snow falls at most sites from time to time. Clive Jermy has seen glades of *Cyathea australis* in southern Australia in temperatures well below freezing, with fronds white with snow (see also Fig. 2). For further evidence we need only wait until next summer, as this winter, 1986/87, several inches of snow and a temperature of -12°C has been reported from Tresco in the Isles of Scilly — the home of the most diverse collection of tree-ferns grown out-of-doors in England. The list of survivors after this ordeal will be very interesting; let us hope that all the tree-ferns and other tender plants survive somehow. In mainland Cornwall the first signs are that most tree-ferns have

survived down to -15°C, admittedly with some protection to younger plants.

Another part of the plant which is probably vulnerable is the trunk. It is a stem surrounded by a fibrous mass of roots and dead leaf bases, and extreme drought or cold could prove fatal. For that reason it is always advisable to leave dead fronds in situ as a 'skirt' and/or protect the trunk with sacking in severe frosts and summer drought. The skirt of dead

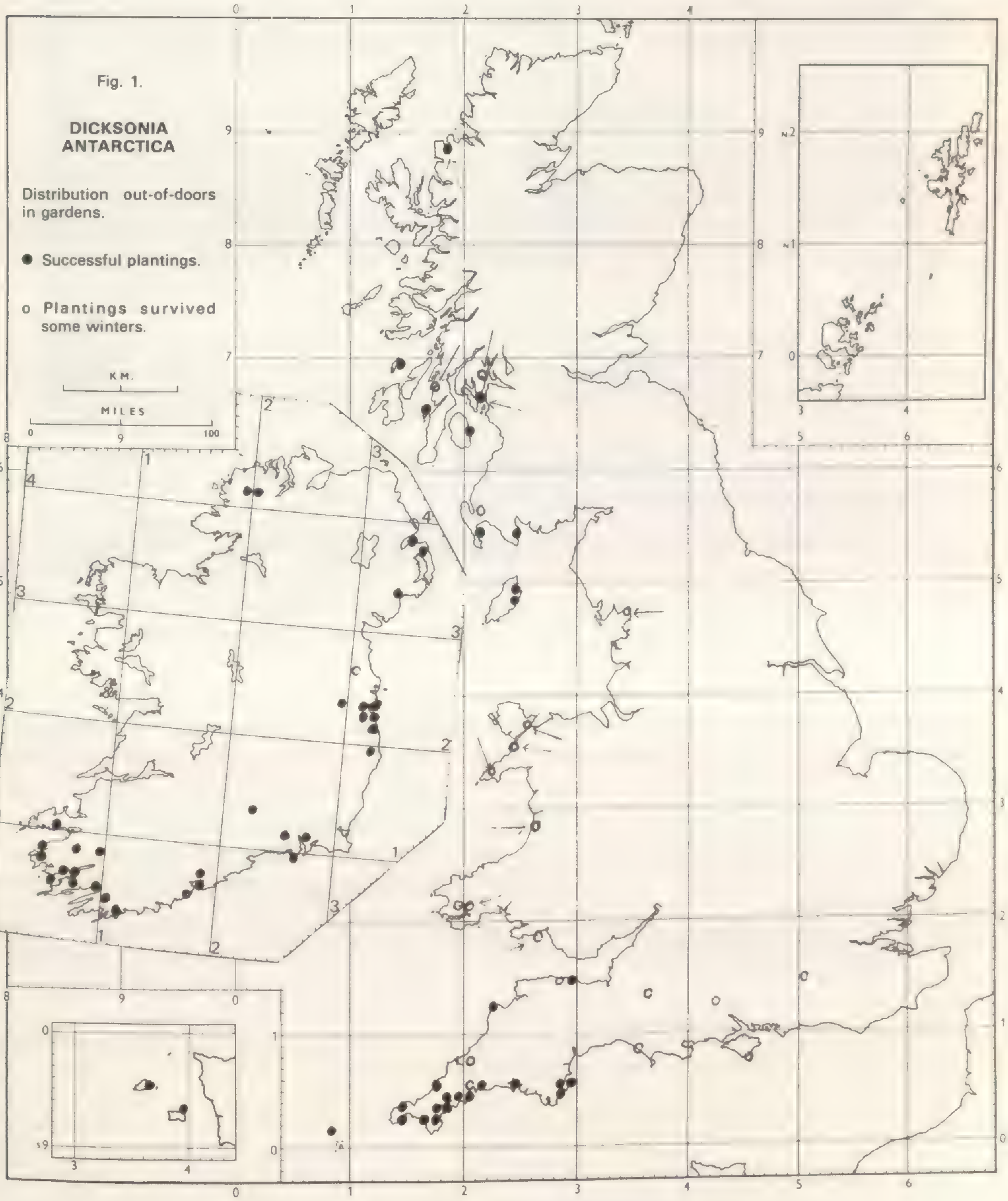

Fig. 1.

fronds may also protect the crown from being reached by climbing plants and large epiphytes (Page, and Brownsey, 1986). Summer conditions do not, however, seem to be a serious problem as long as trunks are kept moist. The newly described *Cyathea brachyphylla* from North Borneo survives out-of-doors in the dry East Anglian climate during summer months, as long as wind protection is given, and water is provided daily (Allen & Holttum, 1975).

Fig. 2.
A group of *Dicksonia antarctica.*
From a photograph taken on Mount Wellington, Tasmania, after a snowstorm.
(From *Select Ferns & Lycopods,* B.S. Williams, 1873.)

To scientifically test climatic requirements inland would need replicated experiments using different protective measures or different species — perhaps at several gardens over several years. This would involve large numbers of similar-sized plants and would obviously be very expensive and practically impossible to set up. At the present time, therefore, critical criteria must remain largely conjectural but, based on the above speculation, it appears that the only seemingly insurmountable problems are the number of frost days and snow cover. With a little effort it may even prove possible to overcome these difficulties.

In planting out, the first consideration is choice of site. Select a position sheltered from winds, especially from the east, where perhaps some winter sun penetrates, but which would be shaded in summer. Do not choose a frost pocket, ideally therefore a mixed woodland habitat. If the soil is not already acid add leaf mould or better still use a standard rhododendron mixture and, for good drainage, sharp sand.

In an attempt to by-pass the temperature problem, this winter I have built a wall of straw bales with a partial polystyrene lining around my young *D. antarctica* (3 foot leaves, no trunk), planted to the south-west of a row of conifers. The top of this shelter is covered by a large polythene bag, itself covered by glass. In really cold weather, to this I add a sheet of reflective 'space blanket'. Using all these shields, so far the minimum temperature in the heart of the shelter has been -3.5°C compared with a minimum outside of -15°C. To date the plant looks well, but only time will tell ...! When, and if ever, I get bolder I might risk a more mature plant outside over winter without a shelter other than a waterproof cap, possibly over some insulation for the crown, plus some sacking around the trunk.

If the measures I am trying do not work, and in the absence of other ideas to try, the next

question is, are there hardier species of tree-fern? *Dicksonia squarrosa* does not look promising. It survives at Tresco, Rossdohan in County Kerry and possibly Penjerric in Cornwall, but looks unhappy at Trengwainton near Penzance in Cornwall and failed recently at Glendurgan near Falmouth in Cornwall, although it was, and probably still is, established at Inverewe in north-west Scotland. *D. fibrosa* has done well at Tresco, Rossdohan and, perhaps significantly, Logan, but is thought to be less hardy than *D. antarctica* in Cornwall. *Cyathea dealbata* grows at Tresco, Rossdohan (Pierozynski 1980, Walker 1983) and Chyverton near Truro in Cornwall, but failed at Logan in the early 1980s. *C. medullaris* survives at Tresco and Rossdohan, but failed at Logan back between the two World Wars. *C. robusta* and *C. smithii* are grown only at Tresco, while *C. mexicana* and *C. australis* are grown only at Rossdohan. *C. cunninghamii* is recorded from Penjerric (Graham 1983) and may still survive there. In addition *C. leichhardtiana* is possibly grown somewhere as it is recorded in the *European Garden Flora* (Walters, 1986).

Of these, *Dicksonia fibrosa* looks one of the best choices but possibly no better than *D. antarctica*. In New Zealand *D. fibrosa* is considered one of the hardiest species, although *C. smithii* and *C. colensoi* should be even hardier. Unfortunately *C. colensoi* rarely produces a trunk and is of potentially less merit in the garden. *C. smithii* does produce a fine trunk and grows on the Auckland Islands south of New Zealand — the most southerly site for any tree-fern. It is not evergreen under glass in the cold fernery at Tatton Park in Cheshire, but experimentation with it in some marginal sites could prove rewarding.

I can find no records for any other species being tried out-of-doors in the British Isles, but Ray Best's article in last year's *Pteridologist* included several additional possibilities, especially those he marked with an asterisk, i.e. *C. woollsiana, C. brownii, C. muelleri* and *C. cooperi*. Although I notice *C. robusta* is grown at Tresco, Ray Best did not consider this one of the hardier options. In addition to this list there are high altitude species from the tropics which may prove reasonably hardy. I have already mentioned *C. brachyphylla* from North Borneo, which might be winter hardy in a sheltered site, but some of the species from New Guinea should be better candidates; of these Ray Best mentioned *C. muelleri*. Others are *C. atrox, C. macgregori,* and *C. gleichenioides*. There may even be some South American species worth trying, particularly *C. fulva* and *C. caracasana,* which grow up to an altitude of 4200 metres (about 14000 feet) in the Andes (Tryon and Gastony, 1975; Tryon and Tryon, 1982).

In summary I can only recommend experimentation. Certainly, at present, material is very difficult to obtain for the rarer species but, hopefully, in time spore will become increasingly available from the Society's list.

Footnote: Inevitably, the map given here and the list of species grown out-of-doors in the British Isles is incomplete. I would, therefore, very much appreciate any additional data. Any offers of spore would also be gratefully received!

Acknowledgements
This article is a compendium of information from very many sources, but, in particular, from Dr Charles Nelson at the National Botanic Gardens, Glasnevin, Dublin. Other valuable detail has been contributed by Kenneth Adlam, Devon; Mrs Allen-Mirehouse, Dyfed; Ray Best, Australia; Nigel Brown, Gwynedd; P. Brownlees, Dyfed; P. Brownsey, New Zealand; J.M. College, Wigtonshire; Mrs R. Clay, Gwent; Ray and Rita Coughlin, Worcestershire; Peter Edwards, Kew; M.T. Feesey, Devon; Dr L. Garrard, Isle of Man; Mrs B. Graham, Cornwall; Derek Fraser-Jenkins, Glamorgan; Roger Grounds, Hampshire; Dr R.E. Holttum, Kew; Clive Jermy, British Museum (Natural History); Major W. Magor, Cornwall; Mrs Y. Matthews, Cornwall; Dr Chris Page, Edinburgh; Mr Raynor, Tatton Park; and Graham Stuart Thomas, Surrey.

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ASPLENIUMS IN SWEET JARS

PATRICK ACOCK
13 Star Lane, St Mary Cray, Kent

Joining the British Pteridological Society at the time of much interest in Asplenium hybridisation, I spent many unsuccessful months trying to raise plants from spores, succeeding only by default in having *Asplenium trichomanes* turn up in a seed tray where it had not been sown. Over the years, however, I have developed a technique that has brought more success.

I mix a compost of 1 part sharp or silver sand and 1 part J.A. Bowers potting compost by volume. To this I add a small amount of crushed charcoal and varying amounts of fine chipped granites. Other additives I have tried, with varying degrees of success, are crushed stone from the sites on which the plants grow, e.g. lead ore for *A. septentrionale* and limestone for *A. ceterach*. I have also tried crushed terracotta pots, a technique used in the past. The terracotta pot seems to provide the ideal site for prothalli to grow, but often many prothalli adhere to each chipping and plants can be difficult to separate.

Into a three inch pot I put ¾ inch of the granite chippings and then top to near surface with the compost, tamping down to about ⅜ inch from the top, with the bottom of another three inch pot. On a draining board I pour on scalding water twice, and then cover with a glass plate three inches square.

After half an hour or so the pots are ready for sowing. I prepare the labels, writing on them with a pencil as I find that 'permanent markers' tend to fade after 18 months, usually leaving no trace to identify plants. Spores are sown carefully on to the tops of the pots, taking care to do so in a draught free room and holding the breath while tapping the spores from the envelope to the pot. The glass cover should be replaced immediately the pot has been sown. I usually rinse my fingers between sowings to dislodge any spores which may have adhered from the previous sowing.

The pots are then placed four to a parallel sided plastic sweet jar laid on its side (Fig. 1). These jars can be stacked up to four high without collapsing, although I have made racks to rest them on. Three inch pots are preferable to smaller ones. Two inch pots tend to be susceptible to gravity, half the pots drying out and the other half becoming water-logged, and suffering, like two and a half inch pots, from too much water reaching the surface. This eventually leads to moss or an algal build up. Into the sweet jar is poured ⅛ inch of a strong potassium permanganate ($KMnO_4$) solution to cut down algal and fungal

encroachment. Three inch watchglasses may be placed over the pots to prevent invasion by "foreign" spores.. Slightly shaded west windows or north windows, in my experience, are best. Easterly windows tend to be detrimental. It may be something to do with the sudden increase in light while the plant is still cool from the night.

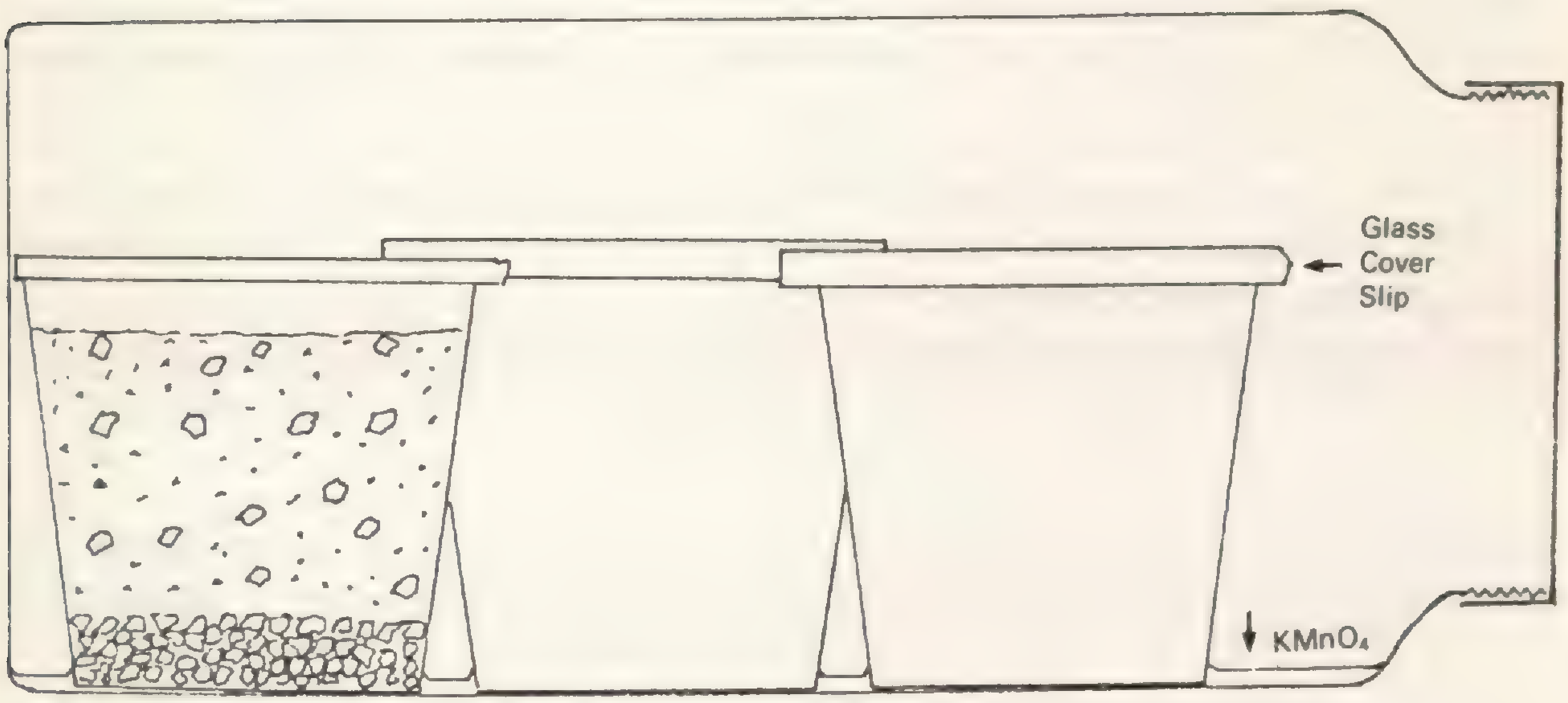

Fig. 1. Spore sowings in plastic sweet jar.

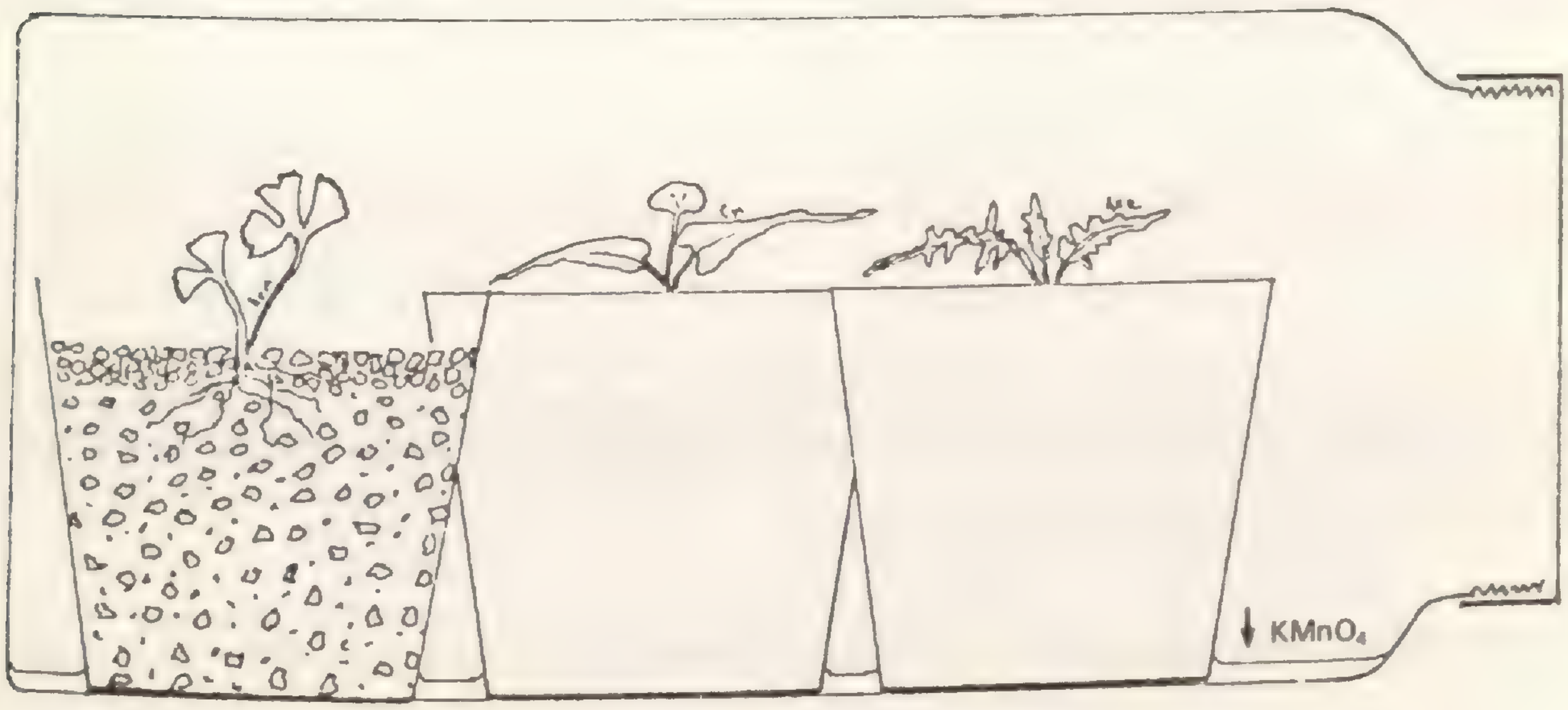

Fig. 2. Sporelings in plastic sweet jar.

When a good crop of prothalli have been formed, the pots are removed from the sweet jar and tepid water can be run on the surface or sprayed onto the prothalli. If there are few prothalli then it may be that the spores have failed and a few stray spores from the previous sowings may have alighted on the surface. It is therefore important to be wary of assuming you have a certain plant when only two or three prothalli appear. If on the other hand there is a large crop then you can be almost certain that you have succeeded in raising your chosen plants.

When the sporelings appear they can be pricked out into three inch pots either three to a pot or just one. Alternatively four and a quarter inch dwarf pots can house eight to twelve sporelings through the next stage. These pots are filled with a mix of 1 part crushed granite, 1 part silver or sharp sand and 1 part J.A. Bowers and some crushed charcoal. The pots are filled to about ¾ inch from the top with the mixture and then to about ⅜ inch from the top with finely crushed granite chippings, about three sixteenths inch. I have long meant to have a colour code for these chippings, green for ordinary watering (our water is very hard) and red for distilled water for the lime sensitive plants, but I never seem to be able to get the same type of small stone twice running. The chippings forestall the build up of mosses and make it easy to remove them when they do. The sporelings are tucked down into the surface stones of the filled pots and put back into the sweet jars for a few weeks to save the plants from the shock of transfer from high humidity to low humidity at this critical stage (Fig. 2).

After a few weeks the end cap of the sweet jar can be left off, remembering to check the watering at this stage, as you may have only done so once or twice in the previous one or two years. After about a month you may wish to move the plants into more permanent open sites. Some plants will be very susceptible to grazing by the tiny pink slugs and great care will need to be exercised in the choosing of positions, e.g. *Asplenium billotii.* Others may be sluggish themselves to harden and develop away from the protection of their jars, e.g. *Asplenium marinum.** Plants may be fed from now on.

You still have not finished with your sweet jars. Slightly tender plants like *Camptosorus rhizophyllus* can be protected by placing the open end of the jar over the plant in extremely cold weather, using a brick as a weight to prevent removal by the wind.

* Certain plants are protected in the wild. Chris Page has suggested that even parts of fronds of *A. marinum* should not be collected. Spores are usually available from spore exchanges of cultivated plants.

EVERGREEN FERNS FROM THE ATLANTIC ISLES

CLIVE JERMY

British Museum (Natural History), Cromwell Road, London SW7 5BD

Those of us who live in the temperate regions of the world quickly come to accept a period of the year when days are shorter and when temperatures generally are considerably colder. Day length changing is a regular phenomenon and varies only according to the latitude. The seasonal drop in temperature is much more gradual and varies according to a complex of climatic factors. Plants have various strategies to overcome these unfavourable conditions; the majority of ferns being perennial will over-winter as a substantial bud at the end of an erect or creeping rhizome, the oncoming winter being heralded by the fronds becoming tarnished, brown and withered, although in some species, the over-wintering of green and apparently functional fronds, may be a diagnostic charactacter.

The subject of over-wintering green fronds is a fascinating one. *Polypodium vulgare* is a

classic example typical of many species in the Polypodiaceae; its fronds being jointed to the rhizome suggest that sometime in their life they will break away cleanly, leaving the rhizome unprotected. This is not obvious in *P. interjectum* or *P. vulgare* but when we look at *P. australe* we get a clue as to the kind of climate and regime in which the plants presumably evolved. *P. australe* and all its derivatives will lose their leaves when there is a dry period, e.g. in the Mediterranean summer. That physiological mechanism is so ingrained in the plants that they loose their leaves at the same time of the year even on the west coast of Scotland where the rainfall may be continuous. I do not have the space to develop this thesis and analyse all our European species, but I was prompted, however, to write this piece when I looked round my garden in November and saw that some species were still quite green whereas others had long since shrivelled and were decaying. I asked myself, did those species that showed green fronds still have anything in common.

I want to record my observations on three genera: *Athyrium, Dryopteris* and *Cystopteris. A. filix-femina* is one of the first British ferns to die down in the autumn. I notice, however, that a number of the cultivars, including *A.f.* 'Clarissima' was still quite green. I have another very attractive form of the species (in no way could it be given a varietal name) which I obtained from the Azores many years ago. Brought back as a sporeling, it developed into one of the most magnificent ladyferns I have seen. It has a relatively short but wide frond with average cutting but very gracefully held in a very dense rosette. This plant is still beautifully green in November whereas, all around, British, Irish, French and Italian specimens have long since died and shrivelled. I have noticed this phenomenon in previous years but never stopped to think whether this plant has an inbuilt mechanism which makes it reluctant to lose its leaves in spite of the shortening days and lowering temperatures. 'Clarissima' on the other hand, at least that discovered by Jones, originated in Devon, by the River Moule, an area where *P. australe* also grows.

Within *Dryopteris* the species that stands out in this respect, is *D. aemula* which is entirely western European and found only in very oceanic places including the Azores and Madeira. That too retains its fronds in a green state for much of the year, as do the two tetraploids derived from it, *D. crispifolia* and *D. quanchica,* both again with Macaronesian affinities.

Another species perhaps should be mentioned, that is *Cystopteris fragilis* forma *sempervirens,* named by Thomas Moore and figured in his *Ferns of Great Britain and Ireland Nature Printed* on plate 46a. Moore points out that although there are records for Devonshire and Kent it is not positively known to be an English plant although certainly native of Madeira. This *Cystopteris* is likely to be what we now know as *C. viridula*; when grown in an English garden it stays green and fresh way into the autumn long after our British bladder-fern has died down.

What I think we are seeing in some of these fern species is a physiological mechanism that was laid down when these plants evolved, possibly some 60 million years ago in the late Tertiary Period. They were the ferns that grew amongst the sub-tropical forests of that northern continent that split to become North America on the one hand and Europe on the other. Remnants of this Tertiary flora are seen in the laurel forests of Madeira and the Azores with a few isolated relics in Spain and Portugal. Some of those species spread back into the more oceanic areas of Europe as the Pleistocene glaciers receded northwards. There were, scattered throughout Europe and North America, isolated pockets which escaped being covered by ice and which must have acted as refuges for many of these fern species. It is from those that a new physiological race, possibly developed to give the type of plant that could cope more effectively with our more cool temperate, seasonal winters. I shall be interested in readers' comments on any of the above, especially on which cultivars of the lady fern tend to be semi-evergreen.

BOOK REVIEW

ENCYCLOPAEDIA OF FERNS by David L. Jones, British Museum (Natural History) and Lothian Publishing, Melbourne, 1987. Pp. xvii, 433, over 400 photographs (including 250 in colour). 182 x 251mm. Price £35.

Australian enthusiasm for new fern books seems to continue unabated. David Jones, co-author of the standard fern flora of Australia as well as some fern gardening books, has now produced what promises to become the standard reference book for the fern grower. This book is indeed an encyclopaedia building extensively on the format of Barbara Joe Hoshizaki's *Fern Growers Manual* (1975).

The book gets underway with five introductory sections taking up most of the first 200 pages. Fern structure is described, along with life cycles and the classification of fern varieties — à la Reg Kaye. Cultural requirements are dealt with in great detail, including fern hybridization and the culture of specialised ferns. There is also a most valuable section on pest and disease recognition, together with advice on their control.

The main part of the book is an annotated list of species worthy of cultivation. Obviously, even a book this size can only treat a minority of the world's ferns, but the selected 700 species, plus many more varieties, are representative of plants in cultivation. The arrangement of this list is novel, being a development of the system the author used in *Australian Ferns and their Allies* (Ed. 2, 1981). Genera are grouped into similar sized chapters by systematic relationships or perhaps by cultural requirements, a strange system which takes some getting used to. Each species is briefly described and cultural preferences given. Many species are illustrated in colour or in black and white. The 250 colour photographs, in particular, are excellent. For north temperate fern growers the guide to suitable growing climates will not be very helpful. For example, many southern hemisphere species not generally considered hardy in the United Kingdom, including several tree-ferns, are classed as *Temp.-S.Trop.* just like proven hardy species such as *Dryopteris carthusiana, Polystichum setiferum, P. aculeatum, Woodsia obtusa* etc.

Of necessity hardy fern varieties tend to be dealt with rather superficially, but most of the better kinds are mentioned. A very few varieties are, however, put in the wrong species: e.g. *Polystichum aculeatum* 'Pulcherrimum' has long been recognised as a form of *P. setiferum,* and some of the polypods are wrongly attributed to *Polypodium vulgare* rather than *P. australe* or *P. interjectum,* but this is specialist ground, and insignificant in a book like this. Of perhaps more importance is the unfortunate decision to illustrate poor forms of *Athyrium filix-femina* 'Victoriae', 'Glomeratum' and 'Frizellae cristatum'. Good examples of all three can be seen in the nature prints in *British Ferns and their Varieties* by C.T. Druery (1910). Varieties of non-hardy genera, e.g. *Nephrolepis, Pteris, Adiantum,* are well covered.

In the appendix ferns suitable for different situations and climatic regions are listed. There is a full glossary and bibliography, and finally a list of fern societies — I was amazed to discover that the British Pteridological Society is now one of at least 22 such societies worldwide.

At £35 it is not a cheap book, but by today's standards I think it is good value in view of its size and quality. In the preface the author expresses the hope that this *Encyclopaedia of Ferns* will run to several further volumes which will look in greater depth at selected groups of species. If future volumes can match the quality of this book then the fern world will be significantly enriched.

MARTIN RICKARD

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Plant Exchange Organiser: Mrs R. Hibbs, 30 London Road, Hailsham, East Sussex, BN27 3BW

Archivist: N.A. Hall, 15 Mostyn Road, Hazel Grove, Stockport, Cheshire, SK7 5HL

Booksales Organiser: J.W. Dyce, 46 Sedley Rise, Loughton, Essex IG10 1LT

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The BRITISH PTERIDOLOGICAL SOCIETY was founded in 1891 and today continues as a focus for fern enthusiasts. It provides a wide range of information about ferns through the medium of its publications and available literature. It also organises formal talks, informal discussions, field meetings, garden visits, plant exchanges and a sport exchange scheme. The Society has a wide membership which includes gardeners, nurserymen and botanists, both amateur and professional. The Society's journals, the *Fern Gazette, Pteridologist* and *Bulletin,* are published annually. The *Fern Gazette* publishes matter chiefly of specialist interest on international pteridology, the *Pteridologist,* topics of more general appeal, and the *Bulletin,* Society business and meetings reports.

Membership is open to all interested in ferns and fern-allies. **SUBSCRIPTION RATES** (due on 1st January each year) are Full Personal Members £10, Personal Members not receiving the *Fern Gazette* £7.50; Student Members £5; Subscribing Institutions £12. Family membership in any category is an additional £2. Applications for membership should be sent to the Assistant Secretary (address above) from whom further details can be obtained. (Remittances made in currencies other than Sterling are £1.50 extra to cover bank conversion charges). Airmail postage for all journals – an extra £3.50, or for those not receiving the *Fern Gazette* £2.50.

(Front cover, *Polypodium interjectum* 'Cornubiense' – "common law" form.)

Back numbers of the *Gazette, Pteridologist* and *Bulletin* are available for purchase from P.J. Acock, 13 Star Lane, St. Mary Cray, Kent BR5 3LJ, from whom further details can be obtained.

EDITORIAL

Since 1959 many fern cultivars have been named outside the rules of the International Code of Nomenclature for Cultivated Plants. These rules were revised in 1980 by a commission of 24 members made up of foresters, agriculturists, botanists plus one or two horticulturists. The aim of the rules is to standardise cultivar nomenclature. These rules apply over a very wide range of plants, including agricultural crops such as wheat or barley, horticultural crops such as apples or lettuces, plus forest trees, shrubs and, of course, ornamental herbaceous plants, including ferns. Because fern cultivar nomenclature has evolved over the last hundred or so years into an internationally understood system of latin names we, as a society, have ignored the 1959/1980 Code. However, we cannot do so forever and the BPS Committee is grateful to Peter Barnes, taxonomist of the Royal Horticultural Society at Wisley, for contributing a full account of the problem of fern nomenclature, plus an interpretation of the code which allows us to retain some familiarity in the names we can legally use. In a future *Pteridologist* it is hoped to put the record straight and republish all illegitimately published names alongside alternatives acceptable within the Code.

Other material in this issue is, perhaps, less momentous, the bulk of it being concerned with garden ferns and their culture. This is obviously a major area for the *Pteridologist* to cover and papers of this type are very welcome, but please do not be put off sending in other types of articles, perhaps on fern distribution at home and abroad, fern conservation, fern literature, etc. – but please also remember that highly technical material, of a type including graphs, histograms, chemical formula, etc., are not *normally* appropriate for the *Pteridologist*. Please remember all copy should be with me by the 31st of December – but preferably earlier!

Finally, on a sad note, I have just heard that Marjorie Castellan has died. She was a long-standing, active member and will be greatly missed. A full orbituary will appear in the next Bulletin.

MISSOURI BOTANICAL
JUL 21 1988
GARDEN LIBRARY

SHORTER NOTE

Osmunda regalis on Sedgemoor

With regard to the note by Mary Potts with reference to the Royal Fern, *Osmunda regalis,* on Sedgemoor, it is gratifying to learn of the re-establishment of this plant due to active conservation work, as I was the first Warden of the Shapwick Heath National Nature Reserve when it was first declared in 1961, and have been concerned with its management until my retirement a few years ago.

Whilst it is good to know that this work is of benefit to the Royal Fern, it has been more beneficial to another even rarer one, the Marsh Fern *(Thelypteris palustris).*

The Royal Fern is not so demanding as to a wet site as the latter and will, and does, grow on the Reserve some two metres above the water table.

There are many rare plants growing here, outside the scope of this short note, but it is worth mentioning two. These are the very rare Brown Beak-sedge *(Rhynchospora fusca)* and the Milk Parsley *(Peucedanum palustre)* which is rarely found outside the East Anglian Fens.

J.V. MORLEY

THE HORTICULTURAL NOMENCLATURE OF FERNS

PETER G. BARNES
R.H.S. Garden, Wisley, Surrey, GU23 6QB

INTRODUCTION

For many years it has been recognised that many of the names used for fern variants did not conform to the internationally accepted rules of nomenclature. Early in 1987 a discussion paper by the author was circulated amongst interested members of the British Pteridological Society Committee, in which proposals were made for a policy that would be in accord with the rules. In July 1987 a meeting was held at Wisley to discuss these ideas. Those present were Jim Crabbe, Jimmy Dyce, Clive Jermy, Barbara Parris, Martin Rickard and the author. After considering the alternatives it was agreed that the proposals should be adopted as the Society's official policy and the paper that follows is based closely on the original document.

HISTORICAL NOTES

The propensity of ferns to produce individuals showing aberrant frond shapes has attracted the attention of alert botanists for several centuries. Fine illustrations of crested and other variants of lady fern (*Athyrium filix-femina*) and hartstongue fern (*Asplenium scolopendrium*), for example, may be found in the pages of Dalechamp's *Historia Generalis Plantarum* (1586) and Plukenet's *Phytographia* (1691-6). Only in the nineteenth century, however, did gardeners develop a taste for such plants. As has been well recorded elsewhere (Allen, 1969, for instance) this period saw also a transition from the introduction to cultivation of wild finds to the deliberate sowing of spores with the intention of raising new variants. Since human nature contains a trait that desires the labelling of everything, there was a rapid proliferation of names applied to these variations. Inevitably, large numbers of names were coined, often in the most imprecise way, before people began to appreciate the need for a more systematic approach.

At that time, the only option available was to give such variations botanical status by using the category **varietas** (more often rendered as 'variety' or 'var.'), or occasionally **forma** (f.). The same approach was applied more generally to variants of other plants leading, for example, to the proliferation of extended Latin names used for dwarf conifers. This policy was less than logical in that a geographical variant occurring over a substantial area and breeding quite true to type would be given the same status as a 'one-off' variation (what botanists often refer to as a 'monstrosity'). The latter might be quite sterile, or not true-breeding, and thus incapable of perpetuating itself over several generations.

Although not widely adopted until considerably later the category of **cultivar** (**cul**tivated **var**iety) was established in 1918 (McClintock, 1966). A cultivar may be defined as an assemblage of plants of similar appearance, that owes its continuing existence and increase to the intervention of man. It is worth stressing that a cultivar may include more than one clone – much depends on the circumscription of the individual cultivar. A common misconception about cultivar names (e.g. Hoshizaki, 1975: 122, but by no means confined to fern authors) is that they are appropriate only to plants that originate in cultivation. This is not true, however, the significant point being that they are maintained by the actions of man in cultivation, *irrespective* of the mode or place of origin. A large number of cultivars of ling (*Calluna vulgaris*), for example, originated as sports or seedlings in the wild, but there is no doubt that, in cultivation, they are best treated as cultivars, since such chance occurrences do not persist and increase in the wild state. Exactly the same principle applies to the majority of fern variants.

It is not always easy to define a dividing line between botanical and horticultural names,

but in most cases there is probably little point in giving botanical status to an individual variant that does not propagate itself in the wild state. In the fern world, even sports of apomictic species, such as *Dryopteris affinis,* which breed true in cultivation, seldom if ever manage to establish themselves in the wild beyond a single generation. They do, however, accord neatly with the definition of cultivar given above. It is increasingly commonly accepted that the great majority of fern 'varieties' in our gardens are, regardless of their origins, most appropriately regarded as cultivars. Because of the risk of confusion with the botanical term *varietas* (= variety), it is desirable to use the more precise term **cultivar** for these man-made or man-sustained variants.

Whilst there is as yet no formal scheme of classification for fern cultivars, the basis of such a system was evolved by Kaye (1968) from the proposals put forward for specific genera by Dyce (1963) and Kaye (1965). Very recently this was elaborated by Dyce (1987) and it is logical to try and integrate Dyce's system of *classification* with any modern system of *nomenclature,* which is what is proposed in this paper.

THE RULES OF NOMENCLATURE

The naming of plants, at both botanical and horticultural levels, is governed by two sets of internationally accepted rules – the *International Code of Botanical Nomenclature (ICBN)* and the *International Code of Nomenclature for Cultivated Plants (ICNCP).* Each is periodically revised, but the basic rules remain constant.

The great majority of names now used for variants of British ferns have never been applied in a systematic fashion. Many of these 'names' are perhaps better regarded as brief descriptions and, since some conform to neither Code, they have no validity as either botanical or horticultural epithets and are thus illegitimate. This is particularly true of numerous names proposed for new cultivars in various British Pteridological Society publications in recent years, but there is no good reason for this state of affairs to continue, as there is an alternative that should be acceptable to all concerned.

Under Article 27a of the Cultivated Plant Code, new cultivar names created on, or after, 1st January 1959 may not be in Latin or part-Latin form. This rules out, for example, the coining of a name like 'Plumosum Smith'. It is therefore necessary for recent cultivar names to be in a modern language, and they are often descriptive or commemorative. In the context of ferns, this appears at first sight to mean that we lose the useful link with the accepted schemes of varietal classification referred to above. However, there is a way out of this difficulty that retains conformity with the *ICNCP* whilst retaining the most useful descriptive elements from the earlier style of name.

THE CULTIVAR GROUP

As mentioned above, many of the names used in Britain for fern cultivars are no more than descriptions, but it is desirable to retain a descriptive element in the naming of new cultivars as far as possible, whilst trying to ensure conformity with the appropriate Code – the *ICNCP.* Fortunately, in Article 26 of its 1969 edition, the *ICNCP* introduced the useful but as yet underused concept of the **cultivar group**. Sensible use of this Article appears to be the key to the establishment of a practical, logical and (under the *ICNCP*) legitimate system of nomenclature for fern cultivars.

Article 26 of the *ICNCP-1980* says:

> When a species ..... includes many cultivars, an assemblage of similar cultivars may be designated as a group. This category is intermediate beween species and cultivar. It is not an essential part of the full cultivar name. If used between the specific name ..... and the cultivar name, the name of the group is placed within parentheses (round brackets).

The Code gives examples of its use based on former botanical epithets that are no

longer recognised, such as *Rhododendron cinnabarinum* (Concatenans group) 'Copper', as well as purely descriptive ones like *Lolium perenne* (Early group) 'Devon Eaver'. The style of the group name is not defined in the Code, but the examples given suggest that the rules for cultivar names should apply. In other words, a group name may be based on a legitimate name at another taxonomic level (e.g. var. or cultivar) so that, in some circumstances, Latin names may be used.

The potential for the extension of this principle to fern names in clear. The great majority of cultivars can be said to fall into one or other of a limited number of types, as defined in Dyce's classification referred to above, which thus forms a sound basis for a system of nomenclature that is legitimate under the *ICNCP*.

The group system adopted here is not an obligatory one, in that not all fern cultivars need to be referred to a group and, as stated in Article 26, the group name is not an *essential* part of the full cultivar name – it is a useful but *optional* appendage. Nevertheless, many fern growers will wish to indicate the group with the cultivar name because of its link with the scheme of cultivar classification. Whilst new groups may be created as needed the divisions of Dyce's scheme should accommodate the majority of cultivars, regardless of the genus. It is proposed that a nomenclatural panel be formed within the Society to agree on appropriate group names providing the best possible combination of the desirable features of the old names and conformity with the International Code.

EXAMPLES OF ITS USAGE

Three cases have to be considered separately: new cultivars; recently, but invalidly, named cultivars; and early 'varieties' now regarded as cultivars.

NEW CULTIVARS

The use of the proposed system for *new* cultivars should present no problems: such plants would be given 'fancy' names (i.e. in a modern language) in accordance with the Code. Each cultivar name must be unique within its species to avoid the risk of confusion or ambiguity. In addition, such cultivars could be attributed to the appropriate cultivar group. A hypothetical example:

Asplenium trichomanes 'Royalty'; if it were a crested form, it could also be cited as: *Asplenium trichomanes* (Cristatum group) 'Royalty'. It would not then be permissible to use the name 'Royalty' for another cultivar of *A. trichomanes*.

RECENTLY BUT INVALIDLY NAMED CULTIVARS

Several names published in recent BPS publications, and no doubt in nursery catalogues also, are illegitimate. Unfortunately, there is no option but to rename these plants, but use of the group system would make this comparatively painless, since those invalid names that incorporate Latin descriptive terms would often fall into the equivalent cultivar group. The examples below do not represent formal transfers or new names: they are merely used as illustrations.

Athyrium filix-femina 'Percristatum Coke' (Coke, 1985); this might conveniently become *A. filix-femina* (Percristatum group) 'Philip Coke'; the first name is illegitimate; the second conveys the same information but is legitimate.

Other ferns named in the same article might need to be completely renamed:

A. filix-femina 'Plumosum Cristatum Coke', for example, could become *A. filix-femina* (Cristatum group) 'Coke's Plumose': again, the second is as descriptive as the first but, unlike it, is acceptable under the Code. Since the group name is not an essential part of the plant's name, the names *A. filix-femina* 'Phlip Coke' and 'Coke's Plumose', respectively, would be equally acceptable.

An ideal to aim for would be the compilation of a check-list of fern cultivars, in which these and other nomenclatural points could be attended to. In the meantime, it is intended to start a search through the Society's publications for illegitimate names. These will be referred to the proposed nomenclatural panel for renaming as necessary, in liaison with the originators of the plants.

OLD CULTIVARS

In general, these would not be affected by this system as the nomenclatural rules applied to older (pre-1959) names are far less rigorous. Some, however, would be more meaningful if accompanied by the appropriate group name. For example, *Athyrium filix-femina* 'Clarissima', itself a euphonious but non-descriptive name, might be placed in the Plumosum group.

CONCLUSION

It is perhaps inevitable that these proposals will meet with some opposition – no-one likes what they may consider to be unnecessary name-changes. However, for various reasons, the issue of fern cultivar naming has to be faced up to. The continued use of names that are not internationally acceptable, because they contravene the Code, cannot be supported and it is a problem that is largely confined to British cultivars.

If an International Registration Authority is ever appointed for the ferns, it would apply the *ICNCP* rigorously. The primary role of IRAs is to ensure uniformity of nomenclature as far as possible and this inevitably means following the Code. The argument sometimes put forward, that ferns should be a special case, is not acceptable. Stability and consistency of nomenclature is in everyone's interests and was the objective behind the establishment of the *ICNCP*.

The overall result of the system here adopted should be to give fern cultivar naming the international acceptability and legitimacy under the Code that it lacks at present. This may be achieved without losing the useful descriptive element of many of the unacceptable names that have been coined in recent years, and could be added to earlier names that do not at present link the plant to the classification. Hopefully, a system based on the policies adopted here should result in the degree of stability and intelligibility that has for years been lacking in fern names.

Acknowledgements
I am grateful to Mr C.D. Brickell, Dr. A.C. Leslie and Mr A.C. Whiteley for reading and commenting on drafts of this paper.

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Members with an interest in the Irish flora will be pleased to learn that a second edition of the *Census Catalogue of the Flora of Ireland* by Mary J.P. Scannell and Donal M. Synnott was published in May 1987. Copies are available at £4.80 plus 85p postage, from The Director, National Botanic garden, Glasnevin, Dublin 9, Ireland.

THE RIPPON LEA FERNERY

CHRIS GOUDEY
Lot 8, Cozens Road, LARA, Victoria 3212, Australia

INTRODUCTION

The restoration of a massive fernery on the 'Rippon Lea' estate at Elsternwick in Victoria has just recently been completed. The structure is like an enormous aircraft hanger, consisting of an arc-shaped iron frame, sixty metres long on the outside of the arc, thirty-seven metres on the inside by eighteen and a half metres wide. The overall height is in excess of nine metres and the whole structure is covered with timber slats.

The fernery has been acclaimed as the finest fernery of its type surviving in a private garden anywhere in the world today.

HISTORY

From the mid 19th century on, the fern craze which was sweeping through England was beginning to take hold in Australia, and many ferneries were constructed in the great gardens of the time. In this State a number of quite amazingly large and bold structures are recorded from Ballarat, Geelong, the Western District, Mount Macedon and the Dandenong Ranges. All, save the newly restored fern-house at Rippon Lea, no longer exist, but a reminder of just how much importance was placed on ferns at that time may be gleaned simply by standing and reflecting for a moment within the dome of the last remaining example of the Great Fern Craze in this country.

Most fashions and excesses which arise suddenly decline just as suddenly, and Pteridomania was no exception. After 1900, changing interests in the nation saw a rapid falling away of fern culture, and it has been necessary to wait nearly 70 years before the rekindling of enthusiasm for ferns as garden plants.

THE FERN SOCIETY OF VICTORIA

Here in Victoria, a specialist Society to give direction to fern growing as a hobby was founded in 1979, and currently enjoys a membership of over 500 dedicated amateur and professional people. Called the Fern Society of Victoria Inc., its members meet monthly and enjoy the advantage of regular publication of an authoritative journal, organised field excursions, visits to other members' collections and a forum of expertise on matters of husbandry which allows free exchange of ideas to the collective advantage of all members.

THE NATIONAL TRUST

When the National Trust acquired the Elsternwick property 'Rippon Lea' in 1974, it assumed responsibility for the restoration and presentation of the house and garden and was quick to realise the significance and extreme importance of the fernery element of the garden. It was not until May 22nd 1984 that sufficient funds were available to commence the enormous task of restoration of the structure. Eventually to cost over $250,000, significant grants of financial support were obtained from the Commonwealth Bank of Australia, the National Estate Grants Committee, the Ian Potter Foundation and the Friends of Rippon Lea.

EXTERNAL RESTORATION

At the time when restoration work commenced, (see Fig.1) the iron structure of the fernery was covered almost entirely with a dense covering of various creepers – no doubt planted to provide shade to the ferns growing below as the original slats used for that purpose gradually deteriorated. Palms emerging through the roof of the structure caused concern as they swayed and struck the iron ribs during times of high winds. Internal irrigation systems no longer operated, and for the ferns themselves only those species of the very hardiest nature were growing successfully. It was, therefore, prior to commencing work on the actual structure itself, seen as necessary to remove all

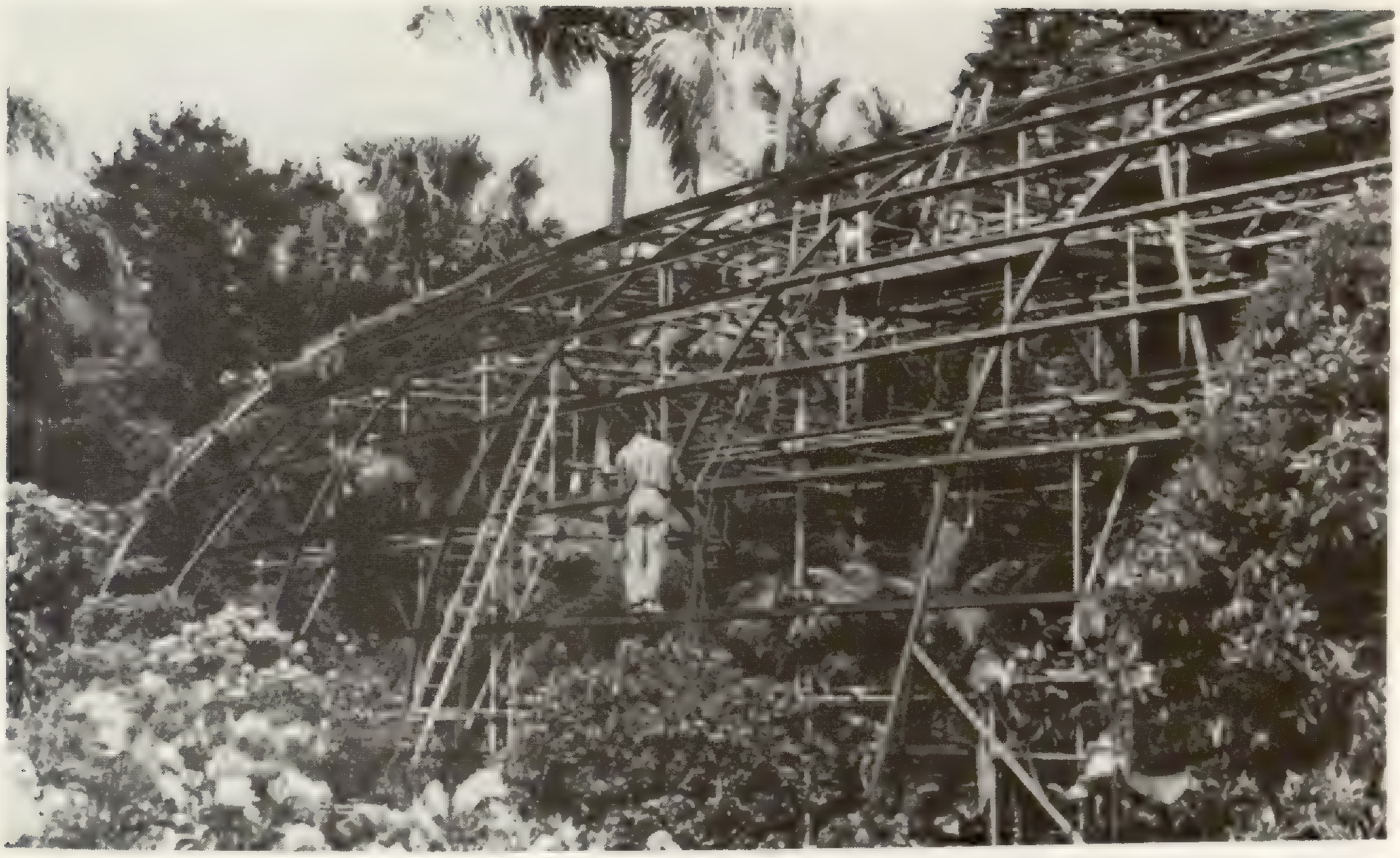

Fig. 1. The fernery at Rippon Lea.
Part of the frame-work during reconstruction.
Note the palms growing through the structure and the vines which had to be removed.

creeper growth and the emergent palms, thus exposing the iron work for restoration purposes. When the fernery was first constructed the iron members which make up each rib of the building had been rivetted in place and it was quickly found that most of these retaining rivets had deteriorated over the expanse of time. Therefore, all rivets were removed and replaced with new high tensile steel bolts. Once this was achieved, carpenters set to and secured the timber members to the iron framework thus enabling the slats to be attached exactly to the original concept and design. Each slat, or lath, received four coats of paint, the colour being determined by laboratory analysis of the few remnant slats occasionally found high on the roof of the structure.

During the process or restoration, constant advice was sought from metallurgists and engineers, and particularly from Professor Len Stevens, Dean of the Department of Engineering at Melbourne University, whose eye for detail and constant encouragement was greatly appreciated by staff engaged on the project. No attempt was made to 'clean up' the iron work of the structure itself, as it was explained that the patina (the rusty covering over the iron) was extremely stable and was best left alone as it served to protect and insulate the iron from further deterioration.

As work overhead progressed, it was possible to expose the supporting columns for examination. Each column was examined and, where necessary, appropriate treatment rendered. The footings were then re-covered with concrete, whose alkaline character would prevent further deterioration of the iron columns, as well as providing the necessary support required.

INTERNAL RESTORATION

On completion of the external matters of restoration, work was commenced on the internal arrangements of the fernery.

Careful notes and drawings had been maintained of every detail of the fernery and so it was now possible to commence the task of restoration of the element. Reference to early photographs of the fernery also helped in restoration decisions.

Major internal works included the rebuilding of the many rock walls and rock terraces that form the basis of the internal appearance of the fernery. The installation of an effective watering system and the re-establishment of the system of waterfalls and creeks which contribute to making the whole resemble a natural fern gully.

Rippon Lea garden staff engaged on the restoration of the fernery soon developed an appreciation of the fortitude of the gardeners who first assembled the mighty structure, particularly where the rock-work was concerned. The very large, heavy and cumbersome rocks could only be manipulated by lever and the original patterns fully restored, an attitude of deference to the skills of the original contractors pervaded.

IRRIGATION

Irrigation in the fernery may be effected by the use of either 'lake' water or Melbourne Metropolitan Board of Works supply. M.M.B.W. supply may be preferred towards the middle or late summer period, when the quality of 'lake' water may sometimes be less desirable for use on ferns.

As well as an 'in-ground' system, moisture may be supplied to ferns in the form of a mist. High in the roof are situated fogging nozzles which serve to humidify the fernery and are especially valuable in the hot, windy, days of summer and autumn.

The necessity for such a system was recognised by Frederick Sargood during his original construction of the fernery.

THE FERN SOCIETY'S ROLE

Members of the Fern Society of Victoria contributed to the restocking of the fernery.

A list of the species already in existence at the gardens was compiled and an appeal for ferns to members of the F.S.O.V. was established.

A large number of species were donated and passed on to Oliver Frost, the curator at Rippon Lea. At the same time a raffle realised several hundred dollars which was sufficient to buy a number of large, hard to obtain exotic tree ferns to add to the variety already in existence in the fernery.

CONCLUSION

The fernery element at Rippon Lea has been acclaimed as the finest fernery surviving in a private garden anywhere in the world (see phots opp. p. 198 and p. 199). It presents to interested persons in Australia, as well as overseas visitors, an unique opportunity to study a large assembly of fern types growing side-by-side in an environment created to protect them in the form of a very large and, in its own right, interesting building. This structure is a huge cathedral, its slatted roof resting on an iron framework held secure on iron columns and featuring an almost total lack of obstruction supports throughout its vast internal dimension. To add to the effect, the whole is constructed in a huge arc, and is very, very impressive.

In Victorian times, the number of fern species, varieties and cultivars available for culture was remarkable, especially by the 1890s. Today over 60 genera, including some 250 species, varieties and cultivars, are under cultivation, and this is possible because conditions have been so arranged that a wide range of habitat opportunities have been created and can be exploited.

Careful attention to conditions of husbandry – provision of a generous depth of mulching material, a porous and well-drained soil medium, the provision of an abundance of earthworms, attention to matters of pH of the soil with appropriate adjustments where necessary, a proper nutritional programme and careful attention to matters of pest control – ensure that the best possible environment for growing ferns is available.

The property 'Rippon Lea' was the home of Frederick Thomas Sargood who lived there

The fernery at Rippon Lea as it is today. Mixed tree-ferns.

The fernery at Rippon Lea as it is today. Note a tall *Sphaeropteris cooperi* in the centre background.
The tree-ferns in the foreground are *Dicksonia antarctica*

The fernery at Rippon Lea as it is today. *Marattia salicina* foreground. *Dicksonia antarctica* in the middle distance to the right.

Ferns on plates, *Blechum spicant* – as *Lomaria spicant*
(Photographed by Steve Munyard)

from 1868 to 1903. Sargood was many things - a politician, businessman, interested in the military and well-known in the social life of the Melbourne of his time. He is perhaps best known nowadays for his influence in the creation of his great garden - a garden of many features - but none I believe a more fitting reminder of the completeness, thoroughness and total competence of Sargood, the horticulturalist, than the Great Fernery of Rippon Lea.

The National Trust welcomes anyone with an interest in ferns to visit the fernery and see for themselves the plants growing there. Staff are always on hand if any special query needs to be answered.

In concluding I would like to extend my appreciation to Oliver Frost, the curator of the 'Rippon Lea' gardens, for making available to me an unpublished article compiled by him, together with old photographs.

FERNS ON A PLATE

Ted Munyard
The Brewery, Urquhart Road, Oldmeldrum, Inverurie, Scotland AB5 0EX

One cannot possibly be interested in ferns and not also succumb to the art displayed so delightfully in the many Victorian fern books, so you can imagine the great pleasure I experienced at discovering a set of 24 hand-painted plates which, I suspect, are completely unknown to the members of the Society.

These are plates in the truest sense, salad plates which are part of a Dinner Service which was presented to the Countess of Aberdeen, by the members of the Senate, House of Commons of Canada, upon Lord Aberdeen's completion of his Term of Office as Governor General of Canada in 1898.

Each plate depicts a North American fern and although the detail of these paintings does not show the accuracy of the majority of book plates they are, nevertheless, a most impressive collection and are to be seen at Haddo House, Aberdeenshire. This house, and its treasures, passed into the care of the National Trust for Scotland in 1979.

Two lady members of The Womans Art Association of Canada, by name M. Robert and Justinia Harrison, are responsible for the fern paintings and each plate bears the artist's signature and the species of the subject.

Isabel Nicholson, the Trust Representative, made it possible for Steve Munyard and myself to examine and photograph the plates and I would like to put on record our sincere thanks for the courtesy shown on our visit to the House.

I list the species, in no particular order other than in two groups, each attributed to its artist. These were the names current at the time, many are now out-of-date. All are North American species.

Camptosorus rhizophyllus
Aspidium fragrans
Schizaea pusilla
Pellaea atropurpurea
Onoclea sensibilis
Cheilanthes vestita
Botrychium ternatum
Asplenium parvulum
Woodsia obtusa
Asplenium ebenoides
Lomaria spicant (illustrated opposite)
Asplenium pinnatifidum

Painted by: Justinia Harrison

Asplenium thelypteroides
Asplenium trichomanes
Adiantum capillus-veneris
Phegopteris polypodioides
Woodsia ilvensis
Botrychium virginianum
Polypodium vulgare
Asplenium parvulum
Adiantum pedatum
Aspidium acrostichoides
Asplenium ebeneum
Polypodium incanum

Painted by: M. Robert

(More recently, in 1948, a set of 18 hand-painted plates of New Zealand ferns was commissioned by the wife of the Governor General of New Zealand to honour a forthcoming royal visit. See *Ferns* by Philip Perl, pp. 56-59, Time Life International 1979. Ed.)

BOOK REVIEW

THE FLORA AND VEGETATION OF COUNTY DURHAM by G. Gordon Graham, Durham Flora Committee and Durham County Conservation Trust, 1988. pp vi, 526, 220 x 308 mm. Price £30 + £2.75 p & p. from 38 Langholm Crescent, Darlington, Co Durham DL3 7SX. Cheques made payable to Durham Flora Project.

Until publication of this book County Durham was one of very few English counties without a flora produced this century. True, this author produced a very useful checklist in 1972, but before that we have to go back to 1868 to find a fully fledged local flora.

Fortunately, the long wait has produced an excellent volume. The introductory section, comprising 65 pages, covers the climate, geology and history of recording etc. and is full of interest. The flora itself is comprehensive (263 pages) with ferns, flowering plants, mosses, liverworts and lichens covered. Distribution maps are given for all but the rarest species. Forty seven species of fern have been recorded for the county, including some which are nationally local or rare, e.g. *Woodsia ilvensis* - now sadly extinct; *Dryopteris aemula* - needs confirmation; *Polystichum lonchitis, Dryopteris oreades* and *D. expansa* - confined to Teesdale; *Gymnocaprium robertianum* - near Middleton; *Equisetum pratense, E. hyemale* and *E. variegatum* - all three as seen on the 1972 BPS excursion *Asplenium septentrionale* has also been recorded on lead mine waste and may reappear one day. The *Dryopteris affinis* complex seems poorly represented with only subsp. borreri recorded. The hybrid with *D.filix-mas* is, however, listed but I wonder if these records are correct in the light of recent research by Christopher Fraser-Jenkins and others?

In a section of 149 pages the vegetation is discussed in a series of habitat analyses. These are very useful as examples of plant communities in the county and as a guide to the type of habitat where different species might normally be found.

Overall this is an excellent account of a very interesting flora. It is a large book and good value by today's standards.

MARTIN RICKARD

PROPOSALS AND PROSPECTS, JUNE 1987

BRIDGET GRAHAM
Polpey, Par, Cornwall, PL24 2TW

It was in April 1987 that I had the privilege of meeting our editor, Martin Rickard. (lEd.)

First impressions are notoriously fallible. I was, and am, embarrassed that he should have assumed that my knowledge of ferns was such that I could contribute an article to the *Pteridologist.* Although dubious as to the wisdom of this exercise and well aware that I am laying myself open to crushing criticism, I am venturing to offer some of my thoughts 'about' rather than 'on' ferns.

I had already made a few notes when I read Martin's article, "The December Garden" (*Pteridologist,* Vol. 1, p.166, 1987). In it he suggests that many ferns are attractive throughout the winter, retaining their green fronds and combining well with the sturdy shrubs that flower during the short days and long nights before and after Christmas. He reminds us that "it has been said that shrubs and ferns do not mix; perhaps that is right .....". It is that traditional assumption that I want to query. I am hoping to provoke debate, curiosity and, above all, the interest that will lead to experiment. If the response is hostile, I must trust it will also be silent.

There are not many of us with gardens large enough to devote certain areas to the cultivation of particular plants. I am sure that most members have a chosen, private corner where their favourite ferns can be cosseted but it is by no means the norm, as it is to find a rockery or vegetable patch. Assuming that space is at a premium and specialising a luxury, I am proposing that by integrating suitable plants with complimentary ferns, the beauty, diversity and pleasure that should be derived from a garden can be immeasurably enhanced. An artist may not have considered the frame for his picture before he begins to paint it, but long before it is finished he will have given serious thought as to how his work can be shown off to the maximum advantage. A jeweller must first assemble his gems, but it is the setting that makes the ornament an objet d'art, thereby doubling the aesthetic and the intrinsic value. I believe that ferns can be used to accentuate the charm of many flowers and that, skilfully partnered, the association will attract a long overdue attention to the ferns themselves. Bringing them out of the shade into the limelight, their grace and divers species merit a far greater number of admirers than they have today among the general public.

It is not a novel idea to grow small ferns such as *Blechnum penna-marina, Asplenium trichomanes, A. ruta-muraria, A. adiantum-nigrum,* even *A. bilottii* and *A. ceterach* in some counties between stones, or in walls, or hedges. Nor can I add to that custom, except to say that, in my opinion, they are better not too near brilliant rock plants. They are most attractive if allowed to appear among prostrate conifers. Possibly they are compatible because both are primitive plants.

Asplenium scolopendrium is almost a weed with us, although the less common varieties are cherished. We have a few yards of dull wall which gets no direct sun and is covered with *Vinca minor.* In the late spring the wall develops a charm of its own. Clumps of pale green scollies thrust up through the uniform dark green carpet, catching every ray of light and flattering the blue stars of the Vinca. The wall has become alive.

The *Cystopteris,* alas, are not really native in Cornwall and they are not at home in our garden. I have lost several species, but while they lived they looked exquisite among low-growing grey-leaved plants, such as *Chrysanthemum harad-janii.* The delicacy of the frond is high-lighted by the dove-coloured leaves beneath it. *Cotula squalida,* too, will set off the bladder ferns, its leaves like miniature fronds themselves, but strong colours are too dominant to team with Cystopteris.

Polystichum and *Athyrium*. The Soft Shield-ferns are particularly plentiful in Cornwall and no two seem identical in formation of their pinnules. The Lady Ferns also are prolific and varied. Although my fernery is but about three square yards around the perimeter of a very small pond, I have several plants of both species and last year I carried out a planned experiment. Between them I have put the elegant *Iris sibirica* 'Alba', the white form of *Iris laevigata,* the deep, mottled mauve of *Iris Kaempferi* and the rich purple of *Iris fulva*. The stiff, rod-like stems of the iris, stand tall above the young ferns in the late spring, the depth of colour in the petals looking particularly striking against *P. setiferum* 'Plumoso-divisilobum'. In June the pale blue *I. laevigata* are out in the pond, as are the water-lilies, and the screen behind is smothered with the great open flowers of pale mauve clematis 'Peter Robinson'. I think I can claim a success. For a fortnight I do not have to say, 'I wish you were here last week'. But the flowers fade, the ferns grow too big, the season moves on and the glory is departed, till next year.

Matteuccia struthiopteris, it has to be said, is a menace. I was rash enough to buy it six or seven years ago and have been trying to eliminate it ever since. We have a wet corner in a field next to the garden, where there is a well and a little spring. We planted *Gunnera manicata* there, which has now overgrown all the native vegetation except the matteuccia. Two years ago I dumped a dozen there, rather than burn them. They have repaid me for the reprieve handsomely, springing up around the base of the giant leaves of the gunnera; the delicate green of the fresh, shuttlecock fronds are as elegant as the gunnera is massive. Neither plant on its own is remarkable, together they give the impression of a semi-tropical swamp.

Blechnum chilense, and *B. magellanicum* are fairly common in Cornish gardens and considered by many to be dull and invasive. Arum lilies, by contrast, are even more widely grown outdoors in the Duchy and always shown off with pride. When these two foreigners are coupled together they add up to that touch of the exotic which is admired with a touch of envy.

Cyrtomium falcatum is an outstanding fern of great dignity, but it is less easy to partner. We grow primulas beside ours and they blend happily enough. I wonder if a delicate flower, such as tillaea or heuchera, would show off the bold, sculptured fronds effectively?

Onoclea sensibilis looks very good with hostas, particularly with *H. undulata* with its smaller leaf edged and streaked with white. This was a chance association where ground cover was needed in a shrubbery. Together they have given us much pleasure and the onoclea which had been condemned by my husband has been allowed to remain, *within* bounds.

Osmunda regalis must be the most ornamental of our British ferns. It is complemented by the arching stems of Solomon's seal, the tall imperial purple loosestrife, (there are several good cultivars) and the deep red astilbes, (not 'Anthony Waterer').

Lilies which enjoy a cool root system can benefit from low-growing ferns, such as *Dryopteris aemula* and *Athyrium nipponicum* 'Pictum', but the ferns must be moved if they grow tall enough to compete with the lilies for the sunlight. It is reputed that the adiantums can be grown outdoors in Cornwall but they do not survive in our garden. I have tried *A. venustum* which struggled on for three years and *A. pedatum* which disappeared after two years, reappeared, and struggled on for another two years and then gave up. Last year I tried a plant of *A. capillus-veneris* near the pond. It did not die, but looked so miserable that I brought it in from the cold.

The failure is mine. I have seen *A. pedatum* flourishing abundantly in the open. It was alongside clumps of *Rodgersia pinnata* whose leaves are described by the Dictionary of Garden Plants as being of 'feathered bronze'. Both plants were thriving in the garden

of a remarkable plantsman who, at 91 years of age, had only one gardener of 87 years to help him maintain four acres of rare treasures which they persuaded to flourish among buoyant weeds.

Woodwardia radicans. I have only one plant of this splendid fern, the other not having emerged since the cruel weather of January 1987. It is grown as a specimen in grass, under the protection of a *Cedrus atlantica* 'Glauca'.

The majority of us with small gardens have to be strict in our selection of the plants we want to cultivate or, more pertinently, to rear those that will tolerate the conditions we have to offer. The financial ill-wind that has forced open the gates of the great gardens has certainly been for the public good. In one such garden in Cornwall there is a wild, narrow valley down which a stream makes its way to the sea. There, the woodwardias crowd each other out, tumbling helter-skelter, clogged with rampant vegetation, bedraggled and undignified, yet presenting a scene from a world lost long ago. I have admired them most in a National Trust garden, grown in a shaven lawn, and suitably distanced from hydrangeas clipped into neat, circular bushes, and dome-shaped green *Acer dissectum*. The uniform grass-green and the space between each presented the complementary details of form and habit to perfection.

I have kept the tree-ferns till last because, of all ferns, I feel the greatest affection and respect for these survivors from the ancient days.

The tree-ferns are themselves, they stand almost literally alone. I have often imagined a glade of these noble veterans under a canopy of forest giants, in a twilight that is always late afternoon. I can only dare dream of one flower that might enhance the magic ..... drifts of white foxgloves, ethereal, elvish. I have put this idea to Mr Nigel Holman of Chyverton, who grows *Dicksonia antarctica, D. squarrosa,* and *Cyathea dealbata.* He smiled and nodded, but that was nearly a year ago and I have had no hint from him that he has ever thought about it since. His concern, and that of others who are proud owners of tree-ferns, has been simply – are they dead? will they sprout again? Last winter was a veritable killer.

Perhaps a few members will ponder my proposals, perhaps one or two will find the prospects pleasing, perhaps another generation will rediscover the Victorian enthusiasm for the welfare of ferns, for whose promotion and propagation, the B.P.S. exists.

A SUCCESS STORY

I felt a total failure
Despite great pains and strife,
I couldn't seem to grow a spore
If it should save my life.
Jack Bouckley – he can do it,
Martin Rickard is a whizz,
The thought of all the experts
Simply put me in a tizz.
First I tried the greenhouse,
The greenhouse got too hot.
My plant pots simply sizzled,
I threw away the lot!

I tried making them wetter
But from ridiculous to sublime
All I managed this time
Was a lot of algal slime.
But at last – Eureka!
P. lonchitis has come up
In B.P.S. tradition
This warrants quite a sup.
The excitement is amazing
The achievement really numbs.
Perhaps at last I'm gaining
Long-coveted green thumbs!

MARGARET ROTHWELL

(Footnote: Line 6 is disputed! Ed.)

MY FERN FACTORY

TONY AND ENID MARRIAGE
The Moorings, Rocombe, Uplyme, Lyme Regis, Dorset DT7 3RR

I have a large garden, 2¾ acres, much of it now shaded by a wide variety of trees. It is on a steep slope facing west, extremely well drained and liable to drought – East Devon is by no means as wet as is often supposed. If it were left to itself, all beauty would be buried under long coarse grass, brambles, nettles, bracken and ash trees. The bracken has been exterminated, and the brambles much reduced, with the help of herbicides. Grass can, of course, be similarly killed, to the great benefit of cowslips, red campion and other wild flowers and weeds, but comes back except in dense shade. The pair of us have looked after this with, until recently, practically no assistance, so we have planted many trees and shrubs, and ground cover for shady and lighter areas. There is a race, of uncertain outcome, between ease of maintenance and advancing age. All this is by way of explanation of why, when I was attacked by pteridophilia, brought on in part by the sight of wild ferns (mostly *Polystichum setiferum)* which came up in a dense planting of *Sequoia,* it seemed a good idea to plant a number of ferns as quickly as possible.

The first attempt, two years ago (autumn 1985), at raising ferns from spores was a complete failure. A lot of spores of Oak Fern had been collected on an autumn holiday in Norway. These and other wild species collected in the garden were sown on glass dishes of sifted peat which had been sterilized in a potato-steamer. After sowing, the dishes were covered with cling-foil and left on a north window-sill. No ferns appeared, but eventually algae and moss. Next spring, determined to be hygienic, I boiled pieces of capillary matting, put them in ice-cream boxes washed with permanganate solution, sowed spores *(Cystopteris regia* and *Cyrtomium falcatum* from bought plants) and again covered the boxes with cling-foil. The matting was kept damp by a wick through the bottom which rested on damp sand (weak permanganate). Again nothing but nasty black and green messes resulted.

I bought Dr. C.N. Page's book, and Reg Kaye's, joined the B.P.S. and had much helpful advice from Matt Busby and other members. Success soon started coming. Plastic pots, 7 centimetres square, were filled with compost `a la Page (1 part steamed garden soil, 2 parts sand, 3 parts sifted moss peat); one was sown without further sterilization and another had boiling water poured through whilst the surface was protected by paper – actually an emptied tea-bag. *Dryopteris submontana* spores were used in both – not perhaps a very exciting fern but one of which I had plenty of fresh spores from a plant bought two years before. Both pots were covered with glass and put by a north window on a shelf over a night-storage heater turned very low; the temperature was about 20-23°C. Within three weeks both showed profuse green dots of prothalli. The second treatment has been used for most subsequent sowings.

In autumn 1986, after reading in Page that "if artificial greenhouse lighting is not available, sowing should always be done in springtime", and having the impatience of old age, I built a fern lamp. This has two 20 watt (2 foot) "Grolux" fluorescent tubes side by side in a hood made of wood and hardboard, lined with aluminium kitchen foil. These lamps are of a peculiar purplish colour; whilst not as bright visually as ordinary fluorescent tubes, they give out much more light in the deep red part of the spectrum where photosynthesis is most active. The lamp is controlled by a time switch. The bottom of the hood is 13 inches from the tube and measures 10 inches by 29 inches. The soil in the pots is 2 feet from the tubes. Inside the legs of the stand there is comfortable room for three trays (unperforated seed-trays), each of which will take 15 of the square pots or 4 quarter-trays: these can be watered from underneath. The pots are 7 centimetres (2¾ inches) square, 6 centimetres (2½ inches) deep and are of a plastic that will stand

boiling water or heating in a pressure cooker. They are very difficult to find in garden shops in this area. The common 'Plantpak' pots buckle in boiling water as do yoghourt pots, margarine boxes, etc., useful though they are for potting-up.

To try the system out, fresh spores of a dozen different species were sown, collected from the wild or from bought plants. all germinated well, some faster than others. They all kept growing through the winter with a daylength of 15 hours of light, later increased to 19 hours, at a temperature around 20-23°C. The fastest grower was *Gymnocarpium robertianum,* some of which, sown in October 1986, were potted up in March 1987 and planted out in May 1987, the longest fronds being then 8 inches long, one already starting pale green sori. This was also the species which most frequently came as strays under other named sowings, no doubt due to carelessness with the spores. They are easily identified by the strong and delicious smell of the young fronds. Other frequent strays were *Asplenium adiantum-nigrum* and *Polystichum setiferum.*

In spring 1987, in anticipation of more spores from the B.P.S. spore exchange and some from seed merchants, another lamp of somewhat different design was made. This was cheaper, as it used a single 40 watt (4 foot) tube, but therefore needed more room. The reflectors, aluminium foil on thin hardboard, were curved to an elliptical shape, calculated to focus the tube roughly to the two sides of the illuminated area, with the idea of getting a more even light; actually, it turned out rather brighter at the sides than in the middle. It seems clear that the shape of the reflecting hood is not critical, but it should come down well below the level of the tube, so that as much of the light as conveniently possible is brought to the pots and not allowed to stray sideways. Brilliant white paint could be used instead of the foil, at least in the upper parts of the hood.

During the spring some 30 different kinds of spore were sown – some of uncertain freshness. Results were more variable and, on the whole, slower than with spores known to be fresh. There were also new kinds of strays, such as maidenhairs.

Times to the first perceptible, but unmistakable, sign of green prothalli have varied between 8 days *Gymnocarpium robertianum)* and, perhaps, a month. Most species come in 18-24 days, but the 3 Oak and Beech Ferns, *Osmunda* and the commoner *Dryopteris* have come in 8-10 days. Some species, however, though not unduly slow to germinate, seem to take a long time to 'fernicate' from the prothalli; *Dryopteris aemula, D. expansa, Osmunda regalis* and *Polystichum lonchitis* are examples. Growth may be encouraged later, as suggested by Matt Busby, by spraying with half-strength 'Fillip' (one part concentrate to 320 parts water), or other foliar feed. Some sporophytes later turn yellowish, seemingly through lack of nitrogen. Spraying with ¼% urea solution (a clean, harmless, synthetic chemical sold by the hundred-weight for cattle feed) has encouraged such plants to strong growth without damage, although it contains nearly 5 times as much nitrogen as 'Fillip'.

The trouble with growing ferns from spores is that if you get any, you get them in vast numbers, which have to be pricked out or potted up. Pricking out into seed trays is much quicker than individual potting (yoghourt pots or 7 centimetre square 'Plantpaks'), but the latter makes for better plants and easier planting out later. To house all the little ferns, two new cold-frames were put up in a shady place and, to help keep them tidy, floored with 'Plantpak' pot trays which one garden centre supplied – most garden centres take the view that these are only for commercial growers' use and will not supply them. I am now (November 1987) having to plant out from the frames to make room for new intakes. So far, I have planted out in the garden over 240 sporelings, including *Gymnocarpium robertianum, Asplenium trichomanes, A. adiantum-nigrum, Dryopteris submontana* and *D. dilatata* 'Crispa'.

Apart from spores the most spectacular results can be achieved with bulbils of *Cystopteris*

bulbifera. They grow rapidly in warmth and light and within 2 months start growing a new set of bulbils. Thus, if each plant produced 5 bulbils in 3 months, one bulbil on January 1st would end up as 156 plants and 625 bulbils by the end of the year. If you then really tried, you would get nearly 100,000 plants in two years. Of course you would need 400, 4 foot fluorescent tubes in a large growing house and 2¼ acres to plant them out in, at 1 foot triangular spacing. Isn't mathematics wonderful? They are pretty plants too, although not evergreen except under continuous long days. Plantlets from *Polystichum setiferum* varieties have not been anything like so fast growing.

In addition to plant production, some experiments on methods have been done. It must be emphasised that the results are only suggestive and far from conclusive, since no special care was taken to equalise quantities of spores, no repeats were done and different species were used for different trials. It seems safe to say, however, that the choice of compost is of some importance. The Page compost, made with good soil from a part of the garden where we used to grow vegetables, resterilized in the pots with boiling water, has been used for nearly all the fern production, and when compared with other composts has generally been at least as good as anything. Some commercial composts, similarly treated, have been as good, e.g. 'Baby Bio' and 'Shamrock' seed composts. Soil from a shady, ferny bank in the garden, with or without peat and steamed in the pot for 20 minutes, produced a white mould; this was controlled with Copper fungicide, but germination was still slow. In the same experiment, with *Polystichum aculeatum,* pure sand gave very slow and poor germination; sifted moss peat gave none at all - could I have forgotten to sow it, or was it too acid for a calcicole?

In an experiment with Osmunda spores, obtained the previous day on a South-west Group meeting in Somerset, Irish moss peat and Shapwick sedge peat germinated first (9 days to perceptible greening), with Page compost and 'Baby Bio Multi Compost' only a day behind. As the contents of used tea-bags looked physically suitable (moisture holding and non-clogging) they were tried, but soon went white with mould and gave no germination. Later, the same material, but pressure-cooked for ten minutes and sown with fresh *Dryopteris aemula* (B.P.S. Dunster weekend), gave the same result.

Clearly there is plenty of scope for further experimentation. Curiosity may have killed the cat, but does no harm at all to humans, young or old. As a final word, fern-raising may be likened to using tomato sauce:

> Shake the bottle, shake the bottle;
> None'll come and then a lot'll.

AN OLD GARDEN IN HEREFORDSHIRE

MARTIN RICKARD
The Old Rectory, Leinthall Starkes, Ludlow, Shropshire, SY8 2HP

In 1986, I was asked if I would like to have a look at some ferns in a semi-derelict Herefordshire garden. The owner, Mr C.H. Fisher, who had recently died, had been a short term member of the BPS, around 1950. The property was left to his nephews who, fortunately, were well aware that the garden had been something special and, within reason, they were pleased to allow interested enthusiasts a look round before the property was sold on.

As soon as I had time I therefore set out to visit the garden. The soil seemed about neutral (ph 7) although a lot of peat had been added in places. The garden sloped down to the south-west, covered by a thick canopy of trees and was quite sheltered, despite being over 600 feet above sea level. To be honest, most parts were very severely overgrown; obviously Mr Fisher had been unable to maintain it in his later years. Nevertheless it was an adventure to plough through the undergrowth, never knowing what one might find. In its heyday the garden had clearly been of the highest quality. A rivulet flowed down the slopes joining a small stream at the bottom. All along the banks of both the conditions were ideal for ferns, and this is where most were found. Many were common, but some surprised me and to see their continued survival after perhaps a decade or so of neglect is, I think, worth putting on record as evidence of the persistence, and hence ease of culture, of each species.

The following list contains the species I found in the garden, with species native to north-east Herefordshire excluded.

Adiantum pedatum 'Subpumilum' – more or less naturalised along banks of stream.
Arachnioides standishii – surviving despite being almost invisible under nettles; the rhizome was under stones. The only place I recall seeing this fern is in the Filmy Fern House at Kew. I now know that this is a fine hardy plant suitable for the garden.
Cyrtomium fortunei
Dryopteris erythrosora
Dryopteris wallichiana
Matteuccia struthiopteris – abundant in boggy ground.
Osmunda cinnamomea – spreading
Osmunda claytonia – enormous clump
Osmunda regalis
Osmunda regalis var. *spectabilis* – spreading
Polystichum munitum
Polytichum polyblepharum
Polystichum sp. – Asian?
Polystichum sp. – possibly a plumose form of *Polystichum setiferum*

There were also quite a few varieties of British ferns:-

Asplenium scolopendrium 'Crispum' – several forms naturalised, mostly fertile
Asplenium scolopendrium 'Marginatum' – several forms, branched or simple, again naturalised.
Asplenium scolopendrium 'Muricatum' – several plants, again naturalised, even spreading beyond the garden perimeter.
Asplenium scolopendrium 'Ramosum' – several forms scattered here and there, obviously naturalised, some forms very good indeed.
Asplenium scolopendrium 'Undulatum' – an extraordinarily convoluted form, the best I've ever seen.

Asplenium trichomanes 'Incisum Moule'
Athyrium filix-femina 'Cristatum'
Dryopteris affinis 'Polydactyla' – naturalised
Dryopteris filix-mas 'Barnesii'
Dryopteris filix-mas 'Linearis polydactyla'
Polypodium interjectum 'Cornubiense' – struggling through ground elder
Polystichum setiferum 'Divisilobum' – one or two plants.
Polystichum setiferum 'Plumosum Bevis'
Polystichum setiferum 'Plumoso-divisilobum' ('Plumosum densum')

As Mr Fisher kept notes of his acquisitions, mainly in the 1950s and 1960s, it is possible to add to the significance of these lists by recording the species which failed to survive. Notable examples were:-

Cystopteris montana, Dennstaedtia punctiloba, Dryopteris aemula, D. clintonia, D. crassirhizoma, D. goldiana, D. intermedia, D. varia, Lunathyrium thelypteroides, Osmunda gracilis, O. palustris, Parathelypteris novaboracensis, Polypodium glycyrrhiza, P. virginianum, Polystichum lonchitis, as well as many rather difficult species including *Asplenium, Pellaea, Pyrrosia* and *Selaginella;* although I note that *Dicksonia antarctica* did survive at least one winter.

Shade in this garden is 100% provided by a most wonderful collection of trees and shrubs, so, I daresay, some of the ferns have been lost through drought. Nevertheless, despite this and invasion by nettles, brambles, bamboos etc, the fact that so many ferns have survived in this Herefordshire garden is quite remarkable. I hope, therefore, it will give others confidence to experiment and encourge the wider culture of these and other ferns.

FOOTNOTE:
The house was sold in early 1987 and the new owners, who have joined the Hereford Group of the National Council for the Conservation of Plants and Gardens, are enthusiastically setting about restoring the garden.

BOOK REVIEW

FERNS OF MALAYSIA IN COLOUR by A.G. Pigott, 458 pp., 1363 colour plates (by C.J. Piggott). 1988 Kuala Lumpur. Obtainable through UK agents, GH Services, Glemham House, Saxmundam, Suffolk IP17 1LP at £43.00 (post-free for payment with order).

This is a beautiful book which presents the wonderful variety of Malaysian ferns in a wealth of excellent colour plates which show both the habit and details of the plants. The text comprises a brief description of the species and varieties covered, fascinating local uses and, more important to the gardener, information on the natural habitat. The chapter on 'Principal vegetation types and fern habitats' will also be useful to anyone trying to provide tender ferns with the best possible growing conditions. C.J. Piggott provides a short chapter on the trials of fern-photography and the equipment he used. Mrs Piggott's book is most interesting in its own right, but it also takes the mystery out of some of the many new additions to the B.P.S. spore list.

JOSEPHINE CAMUS

CULTIVATION OF HORSETAILS

ANTHONY PIGOTT
43 Molewood Road, Hertford, Herts SG14 3AQ

INTRODUCTION

The Horsetails are a fascinating and attractive group of pteridophytes which are much neglected by fern growers. This article is an attempt to summarise their cultural requirements and hopefully to encourage others to begin to grow them. The author currently grows almost all the British species and hybrids, and can assure the reader that Equiseta are both easy and rewarding to cultivate.

The cultivation of Horsetails is a subject which has received little attention in the literature, and is often omitted from more general fern growing accounts. To make matters worse, such references that do exist are often inaccurate and misleading. One of the first serious references in recent years is in Manton (1950); Hoshizaki (1979) contains a more modern mention.

BASIC CULTIVATION

Containers

Any normal plant pots can be used, but should not be too small, not less than a six inch size for an established plant and as much as a twelve inch for larger vigorous ones. Pots may be either plastic or earthenware, though plastic will be more helpful in avoiding the dangers of drying out.

Large containers such as sinks and troughs may be made use of, above ground or buried to give a natural effect. The use of such containers is sometimes recommended rather than direct planting in the soil, to avoid the risk of uncontrolled spread of the rhizomes, but in practice it is only *E. arvense* which grows vigorously enough to become a problem to the gardener.

The rhizomes tend to grow outwards from the centre of the pot, resulting after a time in shoots crowded around the rim. Re-potting into a larger size will deal with this to some extent, but eventually it may be necessary to break up the mass of rhizomes to rearrange them to give a more even distribution of aerial shoots.

Soils, Compost & Fertilizers

Horsetails will grow in most general purpose fern composts and soils, but a good mixture to use is equal parts of loam, peat, sand and clay. Most species seem to be tolerant of a wide variety of soils, short of strongly acidic ones. However, most flourish best in the wild in situations where a mildly acidic soil is flushed by base-rich water, and so it is probably as well to bear this in mind. There appears to be no special requirements for fertilizers, other than the presence of free silica (which would be provided by a little clay), much of which is used in the aerial shoots.

Watering

It is essential that Horsetails are never allowed to dry out. This is a particularly critical problem with those grown in pots, where the rhizomes cannot reach the depth that they would if growing directly in the ground. All species need to have their rhizomes in contact with moisture, even those that appear to grow in very dry situations.

The way to deal with this vital need for water in potted plants is to stand them permanently in trays of water. A water depth of one to two inches will give a reasonable buffer against drought even in the summer months. Standing in water seems to cause no problems of rotting such as might be expected with other pteridophytes.

Light

Horsetails will grow happily in a wide range of light conditions. They seem to do best in cultivation when in strong light but short of full sun. The morphology of the plants varies with the light, those growing in full sun being somewhat bleached, stocky and less well branched, those growing in deep shade being darker green, slender and more well branched.

Shelter

Shelter is not generally important for the healthy growth of horsetails but the more fragile species, for example *E. pratense* and *E. sylvaticum,* will look better for longer if they have some protection against the wind.

PROPAGATION

Division

The simplest method of propagation is by division of the rhizomes. This is best done in the spring, just as the plant is beginning to grow. It is important to have a reasonable length of rhizome, say, six inches, preferably with good shoots starting to emerge from the rhizome joints. Newer growth towards the outside of the plant is most likely to be successful. One can often take advantage of the tendency of horsetails to send rhizomes out from the holes in the bottom of pots. If left to themselves these will usually produce roots and aerial shoots and can be detached from where they emerge from the pot. New divisions are particularly sensitive to water shortage until they become established.

From Spores

Equiseta can be grown from spores in much the same way as for ferns. Any of the usual fern spore techniques can be used but a few additional points should be borne in mind. The spores are green and are only viable for a few days in normal conditions. They have long, fine strips attached to them called 'elaters' which flex violently with even small changes in humidity. This behaviour usually makes the spores stick together as the elaters interlock, and can make it difficult to sow the spores thinly and evenly. The spores most commonly germinate in the wild on damp clayey mud; a thin layer of this on top of the usual spore mix works well but is probably not essential.

Successful germination requires good light and will even succeed in full sun (this is in contrast to the curious advice reported by Rush (1984)). Germination is usually within a week or two but the prothalli can be rather slow growing. They seem to be particularly prone to fungal attack and so extra care must be taken in sterilization before and after sowing.

COLLECTING & ESTABLISHMENT

The successful establishment of horsetails taken from the wild can be a very difficult task. The author originally had many frustrating attempts before the right method was found. The problem stems from the fact that horsetails usually send their rhizomes down very deep and the thin sections likely to be dug up close to the surface may have very little root and hence not be able to sustain themselves and any aerial shoots attached. Digging up sufficiently deep rhizome can be very difficult, especially in the stony, clayey soils in which they often grow.

The first step is to dig up as deep a length of rhizome as possible, looking for new shoots and buds at the joints (as when making divisions in cultivation). If the horsetail is growing in a stream, this can make it much easier to tease out a good length of rhizome. One has to be something of an opportunist, taking advantage of any fortuitous help such as rhizomes disturbed by deep ploughing or emerging from the sides of newly

cut ditches. Anyone having intentions towards *E. telmateia* should take a strong spade (a JCB would be useful!).

Having acquired a good piece of rhizome, preferably without too much in the way of aerial shoots, it must be protected against drying out by sealing in a plastic bag. The plant should be potted in the usual way and then the pot stood in a suitable container of water right up to the rim of the pot. The depth of water is necessary to give a good chance of success. The newly transplanted horsetail should be kept like this until there are clear signs of establishment and new growth. There seems to be no problems of rot as one might expect from this treatment.

Once established, horsetails will usually grow quite strongly and cone readily. (Unlike the findings in Duckett (1970), the author's experience is that almost all species cone within one to two years of being transplanted.)

All the usual considerations concerning collecting from the wild naturally apply and should be borne in mind; however, it is difficult to imagine any of the commoner horsetails being threatened by the collection of small pieces of rhizome.

Reference:

DUCKETT, J.G., 1970. The Coning Behaviour of the Genus Equisetum in Britain. *Brit. Fern Gaz.*, 10 (3): 107-112.

HOSHIZAKI, Barbara Joe, 1979. *Fern Growers Manual.* Alfred A. Knopf, New York.

MANTON, I., 1950. *Problems of cytology and evolution of the Pteridophyta.* Cambridge University Press.

RUSH, Richard, 1984. Raising Pteridophytes from Spores: the Special Cases. *Pteridologist,* 1, 3-7.

BOOK REVIEWS

FIELD GUIDE TO THE FERNS AND OTHER PTERIDOPHYTES OF GEORGIA by Lloyd H. Snyder and James G. Bruce. 270 pp University of Georgia Press. Athens and London. 1986. ISBN 0-8203-0838-2.

This is yet another State fern flora, of mediocre illustrations although most would allow you to determine the specimen in question. Those of the two *Azolla* species would not, however, and close-up drawings of the hair-like glochidia on the microspores and the upper leaf surface would have been very useful to separate the two species *A. filiculoides* (our British plant) and that called here *A. caroliniana* which has been recorded in Holland and may well turn up in Britain. The descriptions leave something to be desired and sometimes do not tally with the illustrations (e.g. in the *Thelypteris* spp.). The distribution maps showing presence or absence of a species in each county are useful and sometimes throw up some interesting problems.

A KEY TO THE GENERA OF NEW ZEALAND FERNS AND ALLIED PLANTS by P.J. Brownsey illustrated by T.N.H. Galloway. 31 pp. National Museum of New Zealand Miscellaneous Series No 15, 1987. ISSN 0110-1447. From N.M.N.Z., Private bag, Wellington, N.Z., and BPS Booksales.

If you have thought enough about ferns to join the British Pteridological Society then you will not think twice about buying this little book. It is simply a guide in the form of a beautifully illustrated key to 66 genera of ferns and fern allies 'traditionally recognised', as the author says, in the New Zealand botanical region i.e. the main islands together with the outlying Kermadec, Chatham, Snares, Auckland, Campbell and Antipodes island groups. Order it quickly before it goes out of print.

A.C. JERMY

NATIONAL COLLECTIONS OF FERNS

MARTIN RICKARD
The Old Rectory, Leinthall Starkes, Ludlow, Shrops. SY8 2HP

For over a hundred years fern growers have attempted to find ways of ensuring the safe transfer of their fern collections from one generation of growers to the next. Unfortunately, success has not always accompanied their efforts and, as with most groups of plants, many of our choicest cultivars have been lost. Therefore, before the British Pteridological Society and the National Council for the Conservation of Plants and Gardens could think about locating national collections today, it was considered most important to examine the problems experienced by our predecessors and, hopefully, find ways of avoiding the same pitfalls.

So far as I am aware, the first national collection of ferns was set up at Kew around 1880 at the suggestion of E.J. Lowe. This was added to from the best collections of the time; W. Carbonell of Usk, alone, donated 4261 specimens in 1887. It is therefore not unreasonable to assume that at least 5000 ferns were given to Kew over this period – including some of the choicest varieties then known. By the 1920s, when the collection at Kew had deteriorated badly, it was partially restocked but, sadly, today the collection is again very small.

Again during the 1880s, a large collection of ferns was donated to the Bristol Zoological Gardens by Col. A.M. Jones. Despite initially being looked after by an enthusiastic Mr. Harris, this collection dwindled in the hands of successive head gardeners and little of it remains today.

Some time later, in 1908, W.B. Cranfield acquired the remnants of the collection of James Moly – one of the most successful of the Victorian fern hunters. Happily, Cranfield safely transported the ferns back to Enfield where they thrived. A great success story! Over the next forty years Cranfield continued to amass ferns as the fern pioneers died, building up an enormous collection. At its peak this was without doubt the best collection ever assembled, with many plants unique to it. Sadly, at this point things went wrong. Cranfield died leaving his ferns to Wisley, where there were already quite a few ferns; at that time it seemed the ideal solution but in 1948, just after the war, things were difficult. A van was sent to collect the ferns and, as the story goes, ferns from a few square yards at the side of the house filled it very quickly but the van is reputed not to have returned for a second load. About *four acres* of the most choice ferns were left in situ for the new owners of the garden to burn off prior to planting vegetables. This *coup de grace* to the last great fern collection was a setback from which the fern cult will possibly never recover.

What can we learn from these tales of woe?

1. I believe the first lesson is not to leave large collections to public gardens unless they are already growing related plants and are *successful* and *interested* in their culture. Unhappily, Wisley was not ready for ferns in 1948. Also, it is important to beware changes of priority from one gardener to the next, as at Bristol. But probably most important, do not attempt to create a site where the collection would be outside the normal scope of the garden – as at Kew where the priority is for species not cultivars.
2. If possible, new collections should only be created in areas suited to the culture of certain species – e.g. *Polystichum setiferum* varieties from Carbonell's collection survived better at Usk than they did at Kew, therefore Gwent would probably be a good area to site a national collection of *Polystichum.*

3. With special treasures it is best, in my opinion, to pass them on to other keen growers, or sell them to specialist nurserymen. It is by these two means that most of the old fern varieties in cultivation today have survived.

So where does this leave the BPS and the NCCPG? Ideally, national collections of ferns need to be located in parts of the country where the soil and climate suits them, so that in times of neglect they have a good chance of survival. In practice this means creating most national collections on a narrow generic or even specific basis, rather than as broad 'general fern collections'.

Collections should be placed only where there is a proven interest and past success in growing the genus concerned.

Collections should be duplicated. If possible, one collection should be in a public garden for easy access while back-up collections, containing the more vulnerable taxa, should be in the hands of enthusiasts and, perhaps, nurserymen. Holders of these national collections should hopefully be able to double as referees.

Bearing these points in mind the NCCPG and the BPS have jointly produced the following interim scheme for the location of the National Collections of ferns:-

Group	Public Collection	Private and Back-Up Collection
Asplenium scolopendrium (100)	Sizergh Castle and Wigan College	?
Dryopteris (150)	Sizergh Castle and Harlow Car	C. Fraser-Jenkins
Osmunda (15)	Sizergh Castle	A.R. Busby
Cystopteris (15)	Sizergh Castle	?
Polypodium (80)	Harlow Car	M.H. Rickard
Athyrium (100)	Savill Gardens	?
Polystichum (150)	?	?
Woodwardia (5)	?	R. Grounds & D. Grenfell
Adiantum (50)	Tatton Park	?
General (900)	Savill Gardens	?

Numbers in brackets give a rough idea of the number of taxa (varieties and species) involved in each group.

National collections are now established, or are being established, at all these sites.

This obviously leaves a lot of unsolved problems. Two of the largest groups, *Asplenium scolopendrium* and *Athyrium*, do not have private collections, while a third large group, *Polystichum*, has neither a public nor a private site.

We do have sites in mind to fill some of these gaps. Nevertheless, by bringing this matter to the attention of the NCCPG and the BPS membership maybe some more suitable sites will come forward for consideration.

REQUEST

Could I please request information on the germination of *Equisetum* spores. I would also be very interested to hear of any species of *Botrychium* kept successfully in cultivation, and any clues as to its cultivation from spores.

Martin Cragg-Barber, 1 Station Cottages, Hullavington, Chippenham, Wilts. SN14 6ET.

AZOLLA FILICULOIDES IN THE LANCASTER CANAL

L.A. and P.D. LIVERMORE
8 Durham Avenue, Lancaster, LA1 4ED

For several years the authors have been recording the flora of North Lancashire. The records for the years 1976-1986 have recently been published (Livermore and Livermore, 1987).

In the above publication only a single record for *Azolla filiculoides Lam.* is reported; this refers to its appearance in the canal at Tewitfield.

The authors are not aware of any other published records for *A. filiculoides* in North Lancashire, nor is it shown for this area in the Atlas of British Ferns (Jermy et al 1978).

The Lancaster Canal in North Lancashire

The Lancaster Canal is a contour canal which commences at Stainton in Cumbria; the flow is from north to south. There is a short branch which runs from just south of Galgate to the basin at Glasson where it flows out into the Lune Estuary via Glasson Dock (Fig. 1).

The canal, including the Glasson branch, is used for recreational boating as far north as Tewitfield; here it is constricted at a point where an embankment carries part of a road-bridge overhead and the water from the northern section is channelled through a specially constructed tunnel which effectively prevents further passage of boats. Boating does not take place in the Tewitfield-Stanton section.

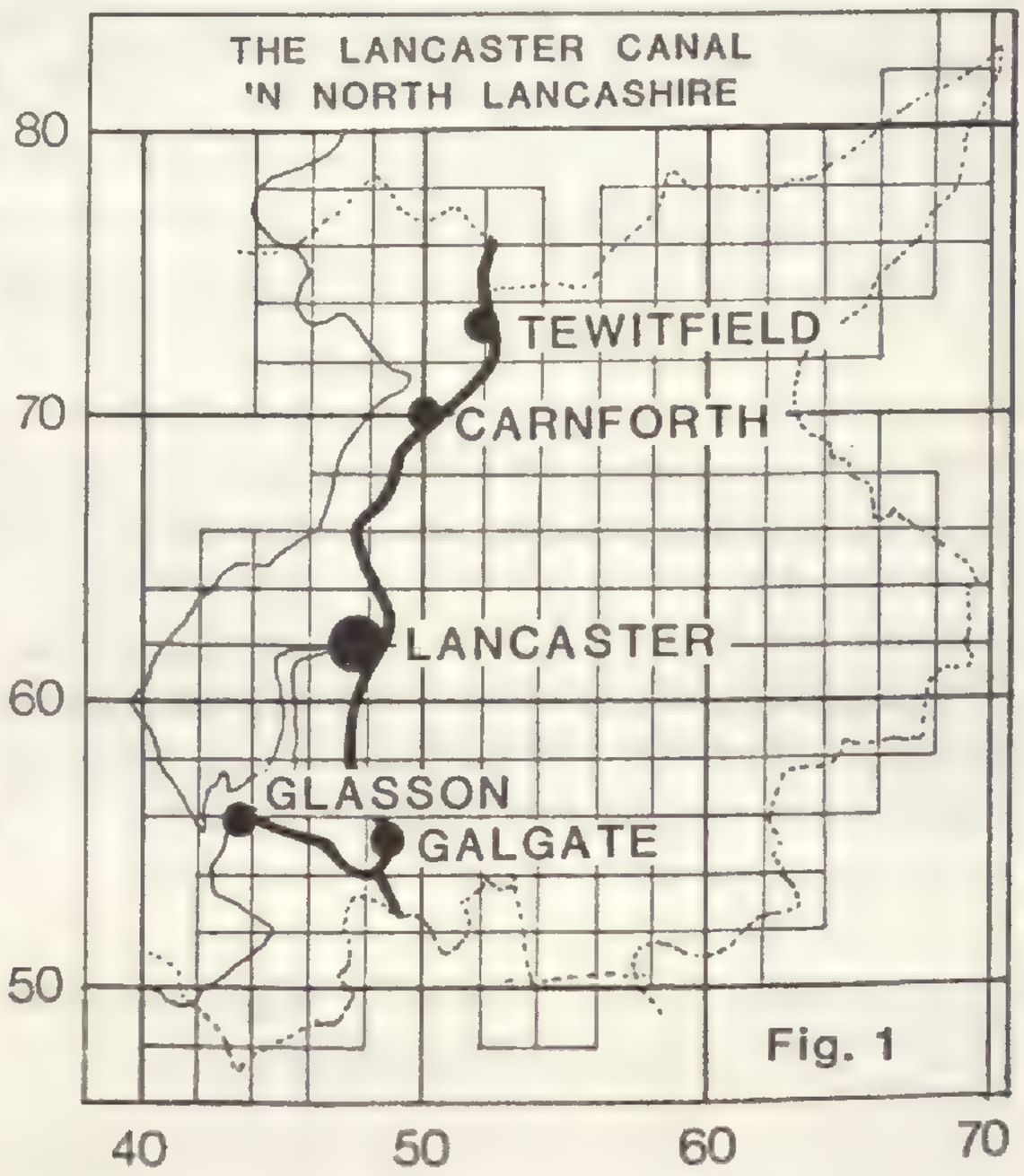

Fig. 1

The Tewitfield record (tetrad 57B)

In August 1985 the authors found *A. filiculoides* at the Tewitfield end of the non-boating section of the canal. Most of the colony fringed the eastern bank and extended almost to the point where the underpass tunnel carries the water through to the boating section. It appeared to be very healthy and, although predominantly green in colour, photographs show there was a small degree of reddening. At this bank there is a stone-bottomed overflow channel from a nearby stream; this takes any surplus water from the stream into the canal at a point not far from the underpass tunnel entrance. The water in the channel is usually fairly shallow with little or no flow; it supports a variety of aquatic plants, i.e. *Elodea, Potamogeton, Rorippa, Lemna,* etc.

During 1986, when the site was visited several times, no *A. filiculoides* was seen either in the canal or in the overflow channel; it seemed to be completely absent. However, in late January 1987 a small colony was found in the overflow channel but none in the canal proper or higher up in the feeder stream. This winter colony was predominantly red in colour and appeared to be in very good condition, but by the early summer months no trace of these plants could be found. Towards the end of 1987 the canal was drained at both sides of the underpass tunnel to permit repair work.

On all occasions when this site was visited, the northern end of the boating section was searched for *Azolla* but at no time were any plants seen in this area.

1987 records further south in the Lancaster Canal (N. Lancs)

During October 1987 Dr. G. Halliday of Lancaster University commented that he had heard that there was some *Azolla* in the canal at Lancaster. Shortly after this, Mrs. A. Hoyer of Blackpool informed the authors that whilst walking along the canal banks from Lancaster to the aqueduct (where the canal is carried over the River Lune) she had seen a lot of *Azolla.*

Following the above information, a search of the North Lancashire section of the canal was carried out during early November. *A. filiculoides* was found in nine tetrads, the northernmost being tetrad 46X immediately north of the aqueduct. Searches above this area failed to reveal any more plants. Proceeding south from the aqueduct the main concentration was found to be in tetrad 46W with smaller quantities in several tetrads further south to well beyond Galgate, and also occurring in the eastern end of the branch canal to Glasson, thus enabling its presence to be recorded in tetrads 46V, 46Q, 45U, 45S, 45T, 45X and 45W. It is possible that the plant's distribution continues south of the authors' recording area.

In total, these sightings occur over a length of approximately 13-14 kilometres of the canal, although in some tetrads there were only a few scattered plants.

In November red was the dominant colour of the countless millions of *Azolla* seen.

Fig. 2 shows the areas searched in November 1987. Fig. 3 shows those tetrads in which *A. filiculoides* was recorded in the same month.

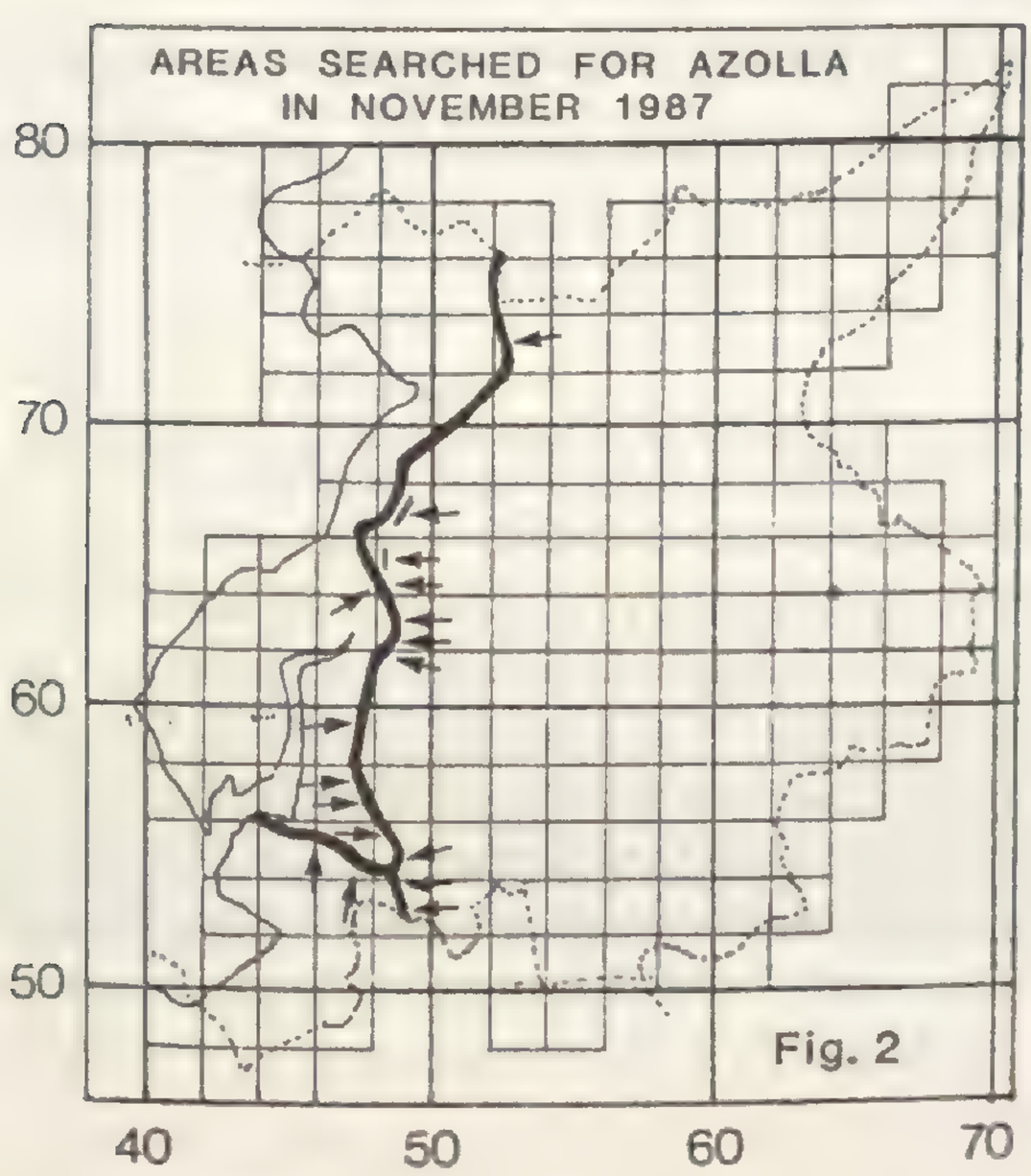

Fig. 2

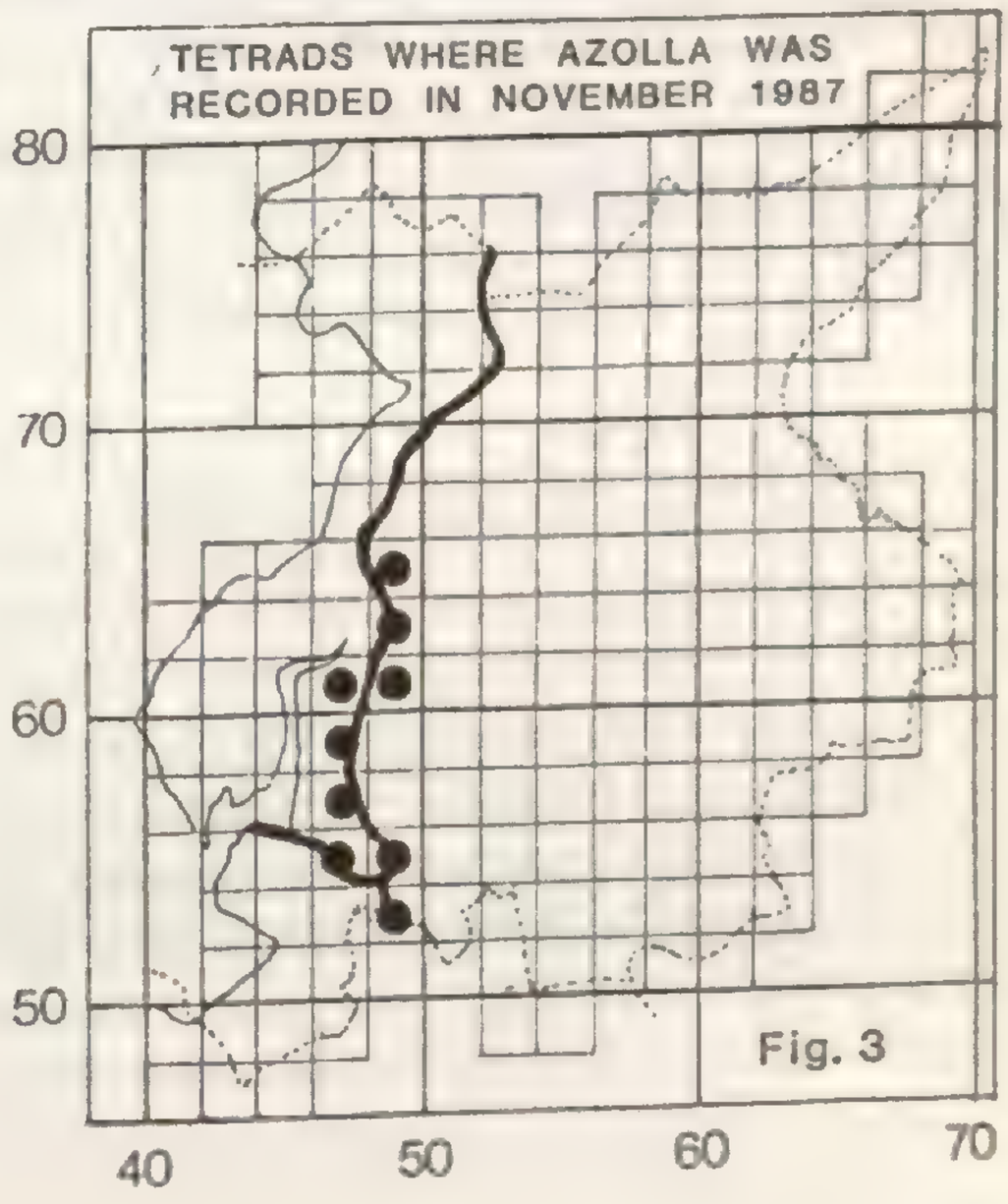

Fig. 3

Summary and comment

1. The authors believe that from c. 1985 to 1987 there have been two quite separate points of introduction:

   (a) Nr. Tewitfield – first observed in the canal during August 1985, apparently absent for much of 1986 (possibly all year), re-appearance in the overflow channel late January 1987, apparently absent through much of 1987.

   (b) Nr. Lancaster – the greatest concentration in 46W in November 1987.

   From here it seems feasible to postulate that the spread of *A. filiculoides* down the canal was aided by the flow of the water and movement created by the

passage of boats; in some tetrads only a few scattered plants could be found. Rather unfortunately, the canal in 46W was not botanised by the authors during the earlier months of 1987, but they had visited 45S, 45T, 45X and 45W over a wide range of dates during the spring and summer and had not seen any *Azolla*. It is suspected that all the November sightings result from a sudden population explosion during 1987, probably in 46W.

2. Broughton Cobb (1963) writes that *A. caroliniana* Willd. (syn. *A. filiculoides* Lam) attains the full red colour in full sun and that it is green in the shade, whilst Clapham et al (1962) describe it as becoming red in autumn. From the authors' very limited observations, the red colouration has been at its strongest at the November and January sightings, thus supporting the Clapham view.

3. Broughton Cobb also writes that he observed it wintering satisfactorily in a pond where, even though there was little ice, the temperature went below 20°F several times in a season (in the U.S.A.). Clapham et al indicate that it suffers severely in hard winters (southern England).

   It will be interesting to see if the Lancaster Canal populations survive the coming winter. A point of further interest will be to see if the plants continue to spread along the branch canal to Glasson where it would then be in a coastal situation.

References:

CLAPHAM, TUTIN & WARBURG. 1962 (2nd edn.) *Flora of the British Isles.*
COBB, BROUGHTON. 1963. *A Field guide to the Ferns,* Petersen Field Guide Series.
JERMY, ARNOLD, FARRELL & PERRING. 1978. *Atlas of the Ferns of the British Isles.*
LIVERMORE & LIVERMORE. 1987. *The Flowering Plants and Ferns of North Lancashire.*

BOOK REVIEW

THE BM FERN CRIB by Josephine Camus and Clive Jermy, British Museum (Natural History), November 1987. Pp. ii, 32. Price £1 plus a stamped addressed envelope size 230 x 160 mm, from Clive Jermy, British Museum (Natural History), Cromwell Road, London SW7 5BD

I cannot believe that any member of our Society who grows or studies British ferns can afford to be without this excellent booklet. No longer should the separation of superficially similar species be a problem, since here the diagnostic characters of each problem species are clearly tabulated, and illustrated where necessary. Guides are given to separate fairly clearly defined species which might baffle the beginner e.g. *Dryopteris aemula* and *D. dilatata,* but much more critical subjects are also tackled, e.g. the subspecies of *Dryopteris affinis* (largely contributed by Christopher Fraser-Jenkins and Anthony Pigott). I can think of no potentially difficult species pairing, fern or fern ally, which is not included. In all 48 different taxa are covered.

The version under review is, in fact, a second, significantly improved, edition. The text has been refined throughout, while the entry on *Polystichum* has been expanded and a three-page section, by Dr Chris Page, on the 3 morphological types of bracken has been added.

Unfortunately, there have been some printing errors, making the addition of a corrigenda sheet necessary; nevertheless, at about 3p a page this booklet is a bargain.

MARTIN RICKARD

POLYPODIUM AUSTRALE 'CAMBRICUM'

J W DYCE
46 Sedley Rise, Loughton, Essex IG10 1LT

This well-known fern variety has been receiving much attention in botanical circles during the past few years. It will be of interest to members to have all the facts concerning it collected into an article, particularly as it has been proposed that the species name *australe* should be replaced by *cambricum.*

HISTORY

This fern is our very oldest variety, famous in both botanical and gardening circles. It was first recorded in 1690 by John Ray, the "Father of English Botany" in his *Synopsis Stirpium Britannicarum,* ed. 1, 22, as *Polypodium cambrobritannicum,* the Laciniated Polypody of Wales. It appears that the record was published by Ray with no mention of his authority and it was mistakenly credited to him. All the information I have been able to assemble from many sources for this paper perpetuates this error and I was in danger of doing the same. By a fortunate chance Martin Rickard recalled that he had seen somewhere (he could not remember where) mention of a paper by either H A Hyde or A E Wade of the National Museum of Wales, Cardiff stating that the fern had been found much earlier by a certain Richard Kayse of Bristol. I approached Dr Barry A Thomas, the present Keeper of Botany at the Museum and he has kindly sent me a copy of the manuscript in question by A E Wade. It is held by the Museum but has never been published. I acknowledge my debt to the National Museum of Wales and to Dr Thomas for the use of the manuscript in this paper. The record, a very long time delayed, can now be put straight.

Richard Kayse, of whom little is known, visited Dinas Powis in 1668 and found, in Ray's words, "on a rock in a wood near Dinas Powis Castle, Glamorganshire in Wales" the *Laciniated Polypody of Wales, Polypodium vulgare* var. *cambricum.* The locality is confirmed by a local botanist, John Storrie, in his *Flora of Glamorgan,* published in 1886. He added that Ray's specimen frond was still preserved in the Natural History Museum in South Kensington, London. (It still is. See Fig. 2.) It is the original 'Cambricum'. Storrie adds further that the colony was completely destroyed about 1876 by an itinerant fern dealer who uprooted all the plants, and hundreds were sold at one shilling (5 pence) each – Storrie bought one! Fortunately, it seems the colony was not quite completely destroyed and the fern was re-discovered in 1908 by the late Rev H J Riddelsdell. Wade states that (in the year his manuscript was written) a search for the fern proved fruitless and adds that nearly thirty years were to pass before there were any further finds of the Glamorgan plants. Only a few years ago the habitat was visited by Dr Mary Gibby of the British Museum (Natural History). She confirms that *P. australe* 'Cambricum' is still there, growing on a rather inaccessible rock face.

The fern was described and named by Linnaeus in 1754 in his *Species Plantarum* as a distinct species, *Polypodium cambricum,* although it was devoid of one of the essentials of a species, i.e. *spores.* As a completely barren plant it was incapable of reproducing itself sexually and could, in my opinion, in no circumstances be regarded as a species. Willdenow was the first to recognise it as a variety and the first reference to it in print was in 1743 in the British Herbal. It was, therefore, one of the very few fern varieties to be of interest not only to the collector but to the botanists. It is mentioned in the *Floras* of Babbington, of Hooker and Bentham and of Hayward and others, appearing in some as *P. cambricum* Willd., in others as *P. cambricum* L.

DISTRIBUTION

Although named *Polypodium australe* 'Cambricum', the Welsh Polypody, from its first discovery being in Wales, many claims for finds in both Wales and England have been

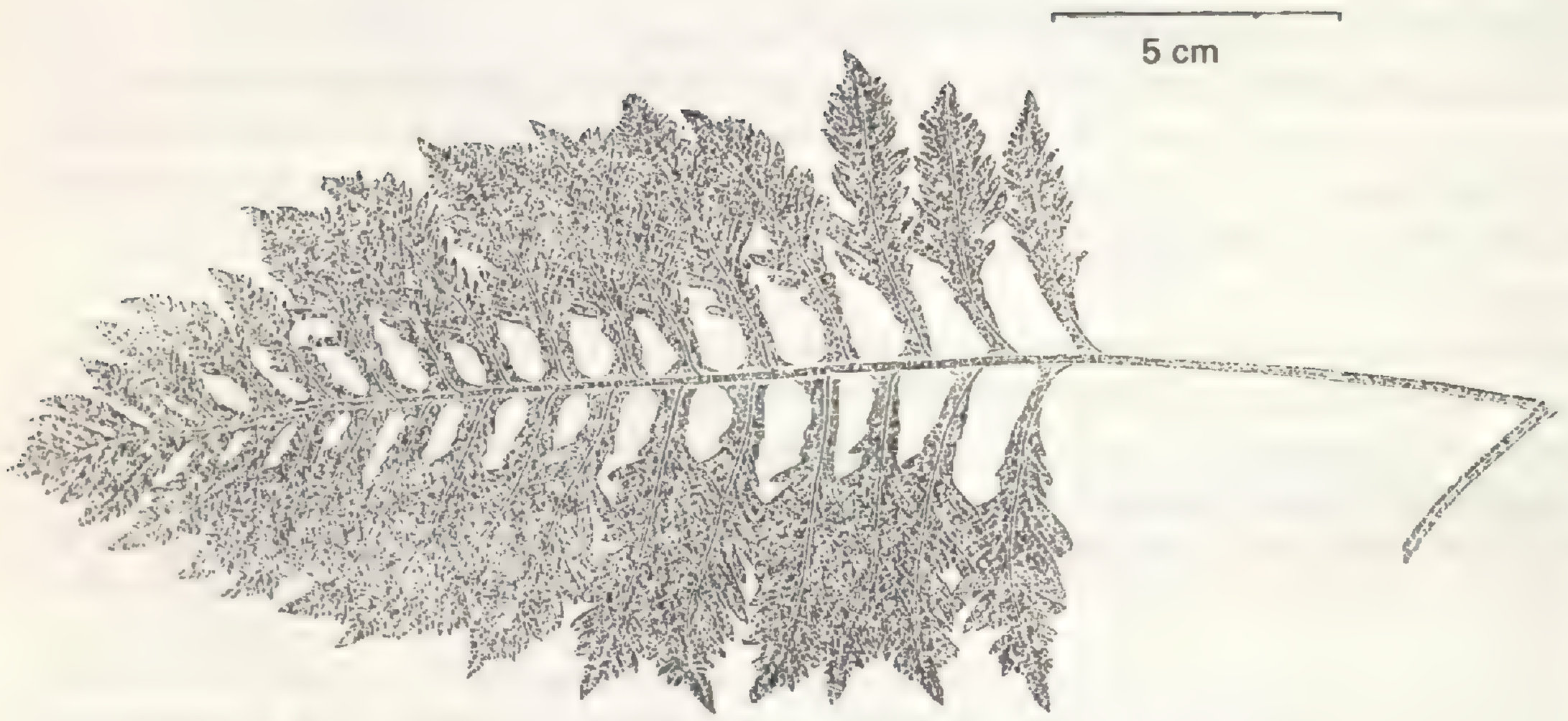

Fig. 1 *Polypodium australe* 'Cambricum' from the Jones Nature Prints.

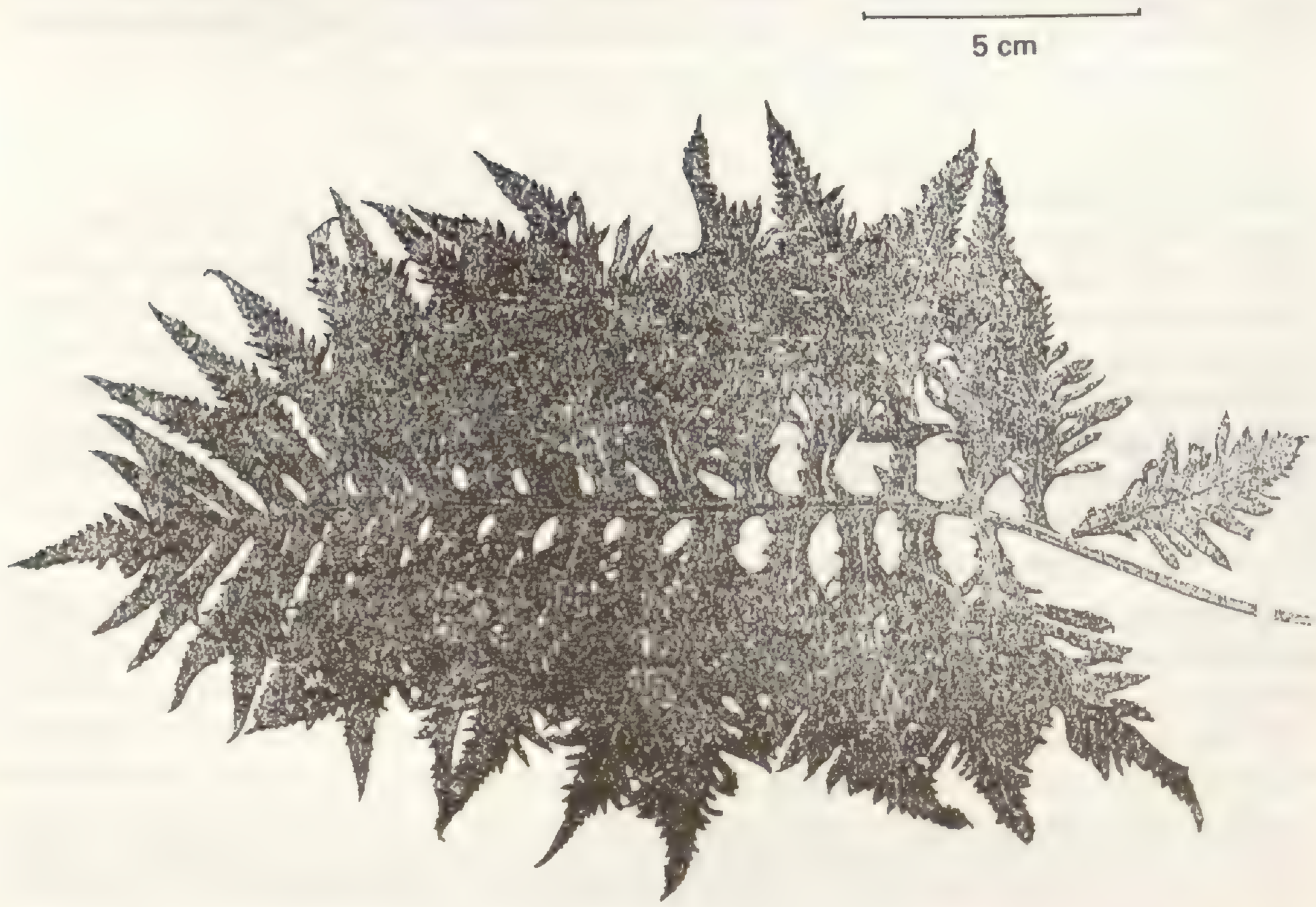

Fig. 2. *Polypodium cambrobrittanicum,* John Ray's specimen of *P. australe* 'Cambricum' collected circa 1690 (Courtesy of the British Museum (Natural History))

made over the years, most of them highly suspect – in fact, several of the reports mentioned the bearing of spores, which obviously nullified the claims. (See later under *Description*). Beaumaris, Conwy Castle, Glamorgan and other places in Wales have been mentioned, and in England Monmouthshire, South Devon, Bristol, Glastonbury, Cheshire and Ambleside in the Lake District. Of these, Conwy Castle is probably a correct record but the fern was possibly planted there in the first place. The Monmouthshire find was a different form, the Cambricum variety 'Oakeleyae', while the Glastonbury one obviously refers to 'Whilharris', another of the Cambricum varieties, found nearby at Pennard.

Other finds of more recent occurrence have been wrongly identified as 'Cambricum'. It should be added, however, that the nearness to this variety of other Polypodium variations – but *fertile* ones – led to the erroneous identifications. Any *true* finds are more likely to be in places where they have obviously been introduced, such as walls. The Conwy Castle record was from a wall, and in 1987 Martin Rickard found the variety on a wall in Cornwall, obviously planted there. It would appear fair to say that possibly only *one* find of 'Cambricum' in Ray's form has ever been made in the wild, the colony at Dinas Powys in 1668, over 300 years ago. Since it has been receiving the attention of growers – and botanists – for most of that time, it *should* have got around a bit.

DESCRIPTION

P. australe 'Cambricum' (Fig. 1) is the plumose form of the species and, as such, is completely barren, with beautiful wide foliose fronds which can be up to six/nine inches broad. They are ovate or ovate-lanceolate in shape, bipinnatifid throughout and thin-textured, very bold and tough, not easily damaged and frost-resistant. The new fronds appear in the late summer, a definite *australe* character, remaining evergreen all the winter and persisting until late in the following summer. The height is about one foot but this can increase up to two feet in very favourable habitats and growing conditions. They have a tendency to be slightly concave, with the basal pinnae projecting forwards. The stipe is long, equal in length to the blade. The pinnae are long, not stalked, narrow at the base, becoming much wider, up to two inches and overlapping, at the centre, and tapering to pointed tips. They are re-divided into long, deeply-cut leafy segments, acutely pointed, serrate, overlapping, linear or linear-lanceolate in shape and irregular in length. At the pinnae bases these are absent or reduced to serrations and at the pinnae tips they gradually reduce to serrations. In poor growing conditions the fronds are dwarfed and the centre segments of the pinnae reduced to deep serrations.

Similar-looking *fertile* varieties of the polypodies can be found and have given rise to the assumption that 'Cambricum' can, in some cases, be fertile. The *australe* variety 'Pulcherrimum' is superficially very like 'Cambricum', with wide foliose fronds and with similarly divided pinnae. This variety is fertile and it lacks the peculiar papery texture and lucent frond surface which characterises 'Cambricum'. Another variety is 'Cornubiense', also fertile, and looking so very like 'Pulcherrimum' that they are often confused. It has one very useful distinguishing character, however – it always produces the occasional, and sometimes more than just occasional, frond of the normal species form; this I always refer to as its "signature tune".

ORIGIN

How did 'Cambricum' arise? Certainly not from the look-alike fertile varieties 'Pulcherrimum' or 'Cornubiense' mentioned above. If either had been around at the time (300 years ago) and growing anywhere near Dinas Powys they would, without doubt, have been found and recorded. Also, the latter with its genetic weakness for producing the occasional normal polypodium frond, would have passed this on, as it has done to all its progeny. Druery suggests we can consider a fertile bipinnate or sub-bipinnate form as a possible parent. Such types are not uncommon in Wales. He was informed by E J Lowe of a Cambricum habitat on an old wall (? rock-face) which had

been completely stripped of the fern after the variety became known in the locality. (Presumably he was referring to the Dinas Powys colony which had been stripped). However, "within twenty yards, growing on an old pollarded willow, was a clump of fertile 'Bipinnatum' with somewhat foliose fronds which could certainly form a most likely progenitor". In Druery's day it was not recognised that *P. vulgare* and *P. australe* were separate species. 'Cambricum' is probably a sport from *australe* – was the foliose 'Bipinnatum', referred to above, *vulgare* or *australe?* If it was the latter, it seems that the suggestion of this fern being the possible parent could be correct.

THE CAMBRICUM VARIETIES

As well as 'Cambricum' itself there are five forms which we regard as varieties of the fern. They are 'Cambricum Barrowii' found in the Lake District in 1874, 'C. Hadwinii' found in Silverdale in Lancashire in 1875, 'C. Oakeleyae' found in Monmouthshire in 1868, 'C. Prestonii' found in the Lake District in 1871, and 'C. Whilharris' of more obscure origin. In 1893 E J Lowe wrote to G Whitwell, a founder member of the *British Pteridological Society,* who lived in the Lake District, that he had received from Somerset a very distinct variety of polypody. It was found at Pennard above Glastonbury. F W Stansfield states in the *British Fern Gazette* in 1935 that this can only refer to 'C. Whilharris', since it was known that the fern came indirectly to Whitwell from Lowe. However, the name Whilharris remains a mystery.

All the five varieties are very distinct from 'Cambricum' itself and, like that variety, are completely barren. In the cases of 'Barrowii', 'Prestonii', and 'Whilharris' the fronds are much more foliose and overlapping. However, there is some degree of confusion in their precise recognition and although I have descriptions of all of them, culled from various sources, we are hesitant about applying them with certainty. Martin Rickard who has contributed much to this article, makes a close study of all the varieties of the *Polypodium* species and is endeavouring to sort out this confusion. Until this has been done we are refraining from publishing more information about the Cambricum varieties at present.

BOOK REVIEW

THE FLOWERING PLANTS AND FERNS OF NORTH LANCASHIRE by L.A. & P.D. Livermore, 154 pp. 1987. Published privately and available from L.A. & P.D. Livermore, 8 Durham Ave., Lancaster LA1 4ED. ISBN 0-9512644-0-0. Price £5.95 incl. p. & p.

The area surveyed in this very successful project, carried out by a husband and wife team over ten years, is that administered by the Lancaster District Council – a total of 220 square miles. It is literally that tongue of north Lancs, bordered by Cumbria and Yorks on the N. and E. and by the southern boundaries of the parishes of Cockeram, Ellel and Over Wyresdale on the south. There are the usual notes on habitats and an interesting map of tetrads (the unit used for the records) showing species richness, with at least four tetrads with over 500 species. Tetrad maps are given for 735 species and 1280 different plants recorded in the entire work.

The work is no mean task, and has been put together as an A4 size work as camera-ready copy to make it this economic price. Also to keep the price down it is "perfect bound", which may prove a drawback. But I have no doubt that the authors will revise it before long – an operation that should be cheap and cost effective. It is a valuable contribution by two keen and competant botanists, which I understand is already in its second reprint.

A.C. JERMY

OLD GUIDES AND WOODSIAS

DEWI JONES
Bod Orwell, Fford Llanllyfni, Penygroes, Gwynedd, LL54 6LY

Very little has been documented in the past about the old Snowdon Guides, and yet, it was these unsung mountain men who led the bygone plant-hunters to the coveted secret localities of the rarer ferns. It is a great pity, as well as a deep loss, to us today that so little mention was made of these guides in the numerous and voluminous "Tourist Guides" that these visitors later, inevitably, wrote. On reading some of these books one is led to believe that the early botanists visiting Snowdonia merely arrived, walked up the mountain, and collected their specimens. However, by browsing through old fern books, topographical books and periodicals of the time one begins to gain a clearer view about the important role these guides played during the fern collecting era.

Edward Newman in his fine book, *A History of British Ferns* (1854), mentions one, William Willliams, as being "an active and intelligent Snowdon Guide and is but too well acquainted with the Snowdonian stations of both the Woodsias". Newman goes on to say, "I don't think he would willingly exterminate them, but he is subject to such constant solicitations from botanical tourists to be conducted to the localities, that the utter extermination of these ferns from all accessible places is not only certain, but also imminent."

William Williams is also mentioned in *The Note Books of Samuel Butler* (1874-1883). Writing of his father's love of collecting Woodsias on Snowdon and Glyder Fawr he states, "There were four plants left on Glyder still when I was young, and William Williams swore that there were none others". There remains a great deal of mystery surrounding the Woodsias on the Glyder. The old fern books refer to this mountain as the "locus classicus" for *Woodsia ilvensis,* but after constant visits and long searches over the years, I know of only one site on this mountain where the fern is extant today.

During the Victorian era ferns, as we all know, suffered from the onslaught of the collecting craze, and it is a fact that the guides profited from this. The name of William Williams is again mentioned in D.E. Jenkins' *Beddgelert, It's Facts Fairies and Folklore* (1899). From this we learn that he was known locally as "Will the Boots", a name he acquired when he worked as a "boot boy" at the Dolbadarn Hotel, Llanberis. There is no evidence to suggest that the William Williams mentioned by Newman, Butler or Jenkins is the same person, but Jenkins has more to say on the life of "Will the Boots". In 1837 or 1838 a hut was built on the summit of Snowdon by a miner called Morris Williams, and here visitors were provided with refreshments and shelter. Morris Williams could only speak welsh and as a result the business venture suffered considerably. In a bid to overcome this difficulty he took William Williams with him into partnership. It would be interesting to know if any fronds of holly fern and other treasures were offered for sale at this hut. At some time after this "Will the Boots" fell to his death on Clogwyn y Garnedd whilst collecting plants with the aid of a fixed rope.

Clogwyn y Garnedd has been known as the site for *Woodsia alpina* since the time of John Ray, and it's dark, wet, steep, north facing cliffs are ideally suited for alpine plants. It is not a place for the inexperienced or the ill-equipped. The *Woodsia ilvensis* said by Ray to be found growing on this cliff has, to my knowledge, never been found since, and so another mystery waits to be solved. The *Woodsia alpina* on the other hand still flourishes here, and each time I feast my eyes on this lovely fern growing wild on the rocky heights above Llyn Glaslyn, my thoughts wander back to the time when dark-cloaked gentlemen stood in exactly the same spot and enjoyed the same satisfying rewards.

I very seldom meet anyone of kindred interest when out on my fern-hunting trips, and I sometimes wonder if the old adventurous and inquiring spirit still exists in the British fern enthusiasts of today?

PTERIDOPHYTES IN THE NATIONAL MUSEUM OF WALES

B.A. THOMAS, Keeper of Botany,
National Museum of Wales, Cathays Park, Cardiff, CF1 3NP, Wales

The Botany Department was established with the other Natural Science departments at the inception of the Museum in 1907. Since then the herbarium, our other botanical collections and our library have all been steadily enlarged. Emphasis has been always on the Flora of Wales, but collecting and acquisition have never been limited to the Principality. Much research has been done on the distribution of species in Wales and, although this work continues, a new emphasis is being given to the evolution of our Welsh flora and vegetation.

Although pteridophytes have never been a major component of the herbarium I am attempting to make them so. We have at present approximately 7,000 sheets of pteridophytes which are stored in a new mobile compactor unit which gives us ample room for expansion. I am interested in acquiring collections of pteridophytes and am always pleased to accept specimens for the herbarium and to consider exchanging Welsh specimens for them. I am also attempting to build up our numbers of named fern cultivars that are still in cultivation. All of our collections are naturally available for consultation and for loan by *bona-fide* researchers.

Welsh Ferns was first published by the National Museum of Wales in 1940, being written by the Keeper and Assistant Keeper, H.A. Hyde and A.E. Wade. Four editions later in 1969 the book was expanded by the new Keeper to include the lycophytes and horsetails and was published under the names of H.A. Hyde, A.E. Wade and S.G. Harrison. The last edition (6th) in 1978 included minor taxonomic changes and more information on hybrids. Although called *Welsh Ferns,* the book has never been limited to Welsh pteridophytes and eventually included all the species and hybrids native to the British Isles, together with the few naturalised aliens. A new seventh edition is currently being written in the Department. It will bring the taxonomy up to date and include maps for the first time.

The Department also plans to publish a relatively inexpensive colour poster of ferns in the near future.

REQUEST

I am currently attempting to develop techniques for growing tree-ferns out-of-doors here in Herefordshire. To date only small plants have been tested, but all have survived in a fairly elaborate shelter. More mature plants are reckoned to be hardier, particularly if a trunk height of 2 feet or more has developed. Therefore, if any member knows of any such mature tree-fern (excluding low altitude tropical species) available for sale or exchange, could he/she please contact Martin Rickard, The Old Rectory, Leinthall Starkes, Ludlow, Shropshire, SY8 2HP. Please note that the international movement of tree-ferns is restricted by CITES legislation, therefore this request must probably be confined to United Kingdom sources.

APOGAMY IN FERNS

JENNIFER IDE
42 Crown Woods Way, Eltham, London SE9 2NN

The life cycle of the pteridophytes, as described in the introduction of many books on ferns, is known by the botanist as an 'alternation of generations life cycle', that is, the asexual, spore producing generation, the sporophyte, alternates with the sexual, gamete producing generation, the gametophyte (Fig. 1).

The genes which determine the characteristics of an individual organism are borne on chromosomes in the nuclei of its cells. The sporophyte generation of pteridophytes has duplicate sets of chromosomes in each nucleus (the diploid condition), whilst the gametophyte generation has a single set (the haploid condition), the reduction having occurred during the formation of the spores. The diploid condition is restored when the sperm and egg, produced by the gametophyte, fuse at fertilisation to give a cell which will germinate and develop into the next sporophyte generation.

Anyone interested in growing ferns soon comes across the expression 'apogamous ferns'. Apogamy is the development of the sporophyte generation from the vegetative tissue of the gametophyte generation (the prothallus), and not as the result of sexual reproduction. This raises a number of questions about the rest of the life cycle, especially that of the number of chromosome sets in the succeeding generations, both gametophyte and sporophyte.

A brief search of the literature soon reveals that the so-called 'normal' life cycle is in fact far from normal and that a large number of ferns exhibit occasional, frequent and even obligatory deviations from it. In these deviant cycles, one or more of the stages in the basic cycle are circumvented, e.g. gamete formation, fertilisation, spore formation, and even one of the generations.

There are four phenomena which result in deviant life cycles: parthenogenesis, apospory, apogamy and vegetative reproduction. Parthenogenesis and apospory are rare in nature in pteridophytes and therefore, probably have not been an important factor in their evolution. Vegetative reproduction and apogamy are of more significance. It is apogamy which is the subject of this essay.

As a natural phenomenon apogamy appears confined to the homosporous ferns and is obligatory (Lovis, 1977). It is unknown in the other pteridophyte groups, including heterosporous ferns, with the possible exception of *Isoetes,* a member of the Lycopsida. Facultative apogamy is only known as a laboratory-induced phenomenon.

Apogamous sporophytes usually develop on the thickened cushion of the prothallus. One of the first and best indications of apogamy is the appearance of tracheids of the developing sporophyte, just behind the apical notch of the prothallus. (Tracheids are water-conducting cells, with distinct annular (ring-like) thickening, not normally found in gametophytes.)

Apogamy gives rise to sporophytes with the same number of chromosomes as the gametophyte which, if the basic pteridophyte life cycle was operative, would mean haploid sporophytes, and spore production would not be possible. In practice, apogamy has been found in the wild only in gametophytes with the diploid or a higher number of chromosomes but, even so, normal spore production is not possible. A compensating mechanism which has arisen in these ferns, operates at spore formation and results in spores with the sporophytic number of chromosomes rather than half that number. The gametophyte and sporophyte generations, therefore, have the same chromosome number (Fig.2). (As a note of interest, such a mechanism also operates in sexually reproducing ferns and in hybrids where there is no apogamy, having arisen independently in these groups).

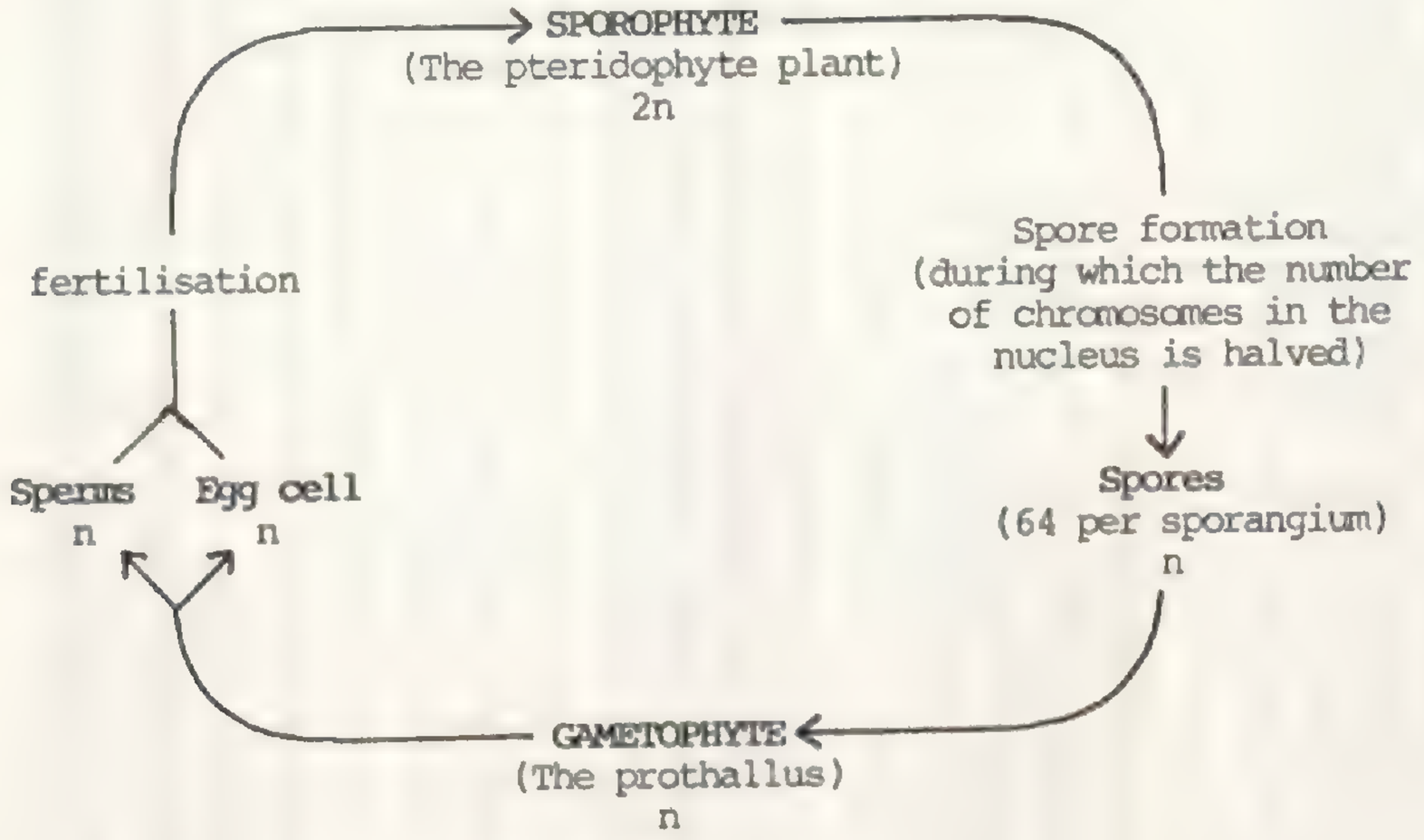

Figure 1. The alternation of generations life cycle of pteridophtes
(n = the base number of chromosomes as found in the gametophyte generation)

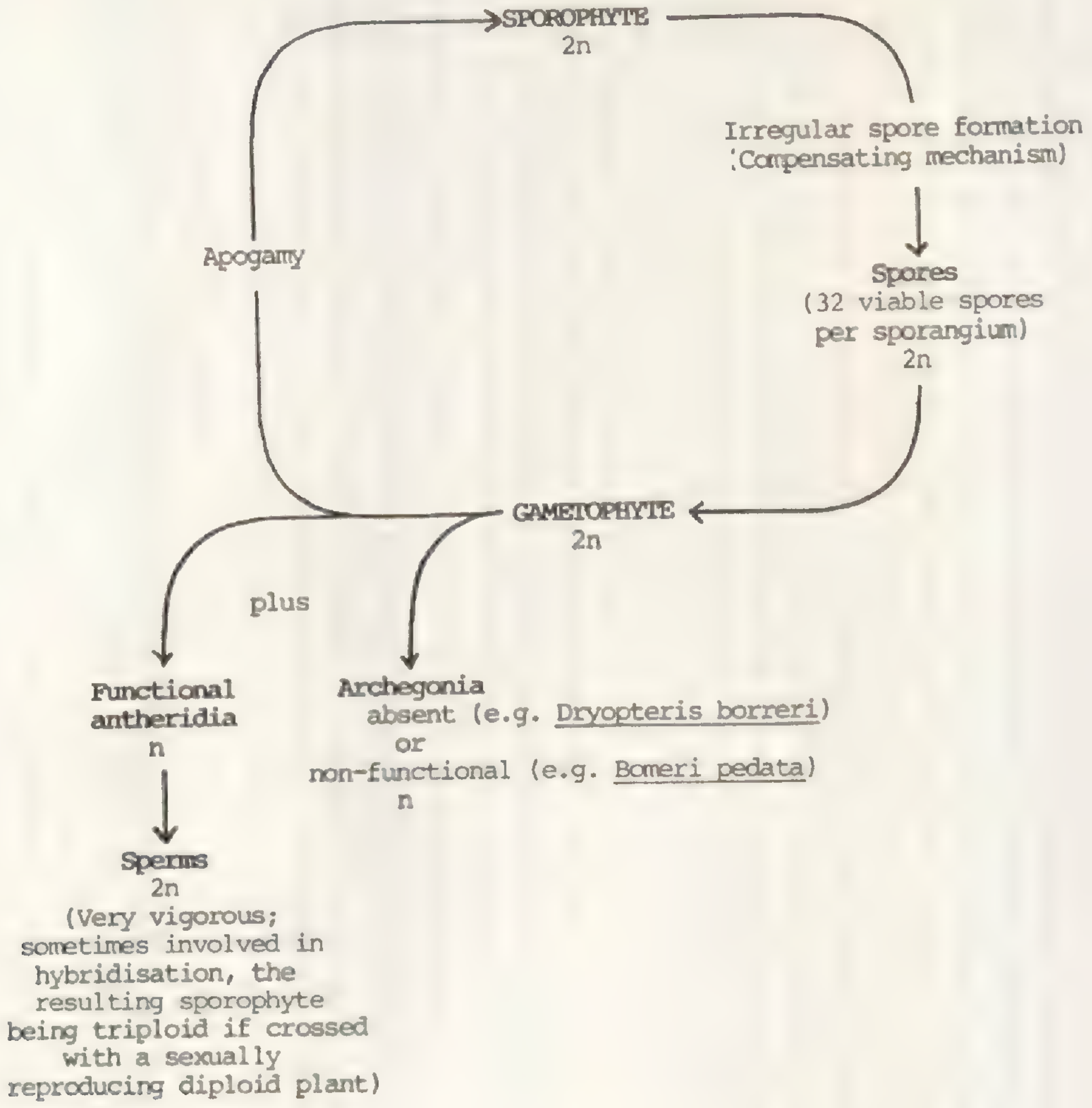

Figure 2. Diagram summarising the possible pathways in the life cycle of an apogamous fern

There are two well documented compensating mechanisms in ferns with obligate apogamy: the Dopp-Manton system and more rarely, the Braithwaite system. It is not known why, but two types of spore formation occur in Dopp-Manton ferns, even within the same sorus of an individual plant, though their frequencies differ in different species. In the first type non-functional spores are formed. This occurs frequently in *Dryopteris x fraser-jenkinsii* but is of low occurrence in *Dryopteris affinis*. In the second type, which occurs more frequently in most apogamous ferns, thirty-two viable spores are formed, each with the sporophyte number of chromosomes. This type of division occurs frequently in *Dryopteris affinis*, but of low frequency in *Dryopteris x fraser-jenkinsii*. The Braithwaite system was first described for *Asplenium aethiopicum* (Briathwaite, 1964). As in the second Dopp-Manton type of spore formation, thirty-two viable spores, with the sporophytic number of chromosomes, are formed. The production of thirty-two viable spores per sporangium is in contrast to the production of the normal number for ferns of sixty-four spores, making it easy to identify apogamous ferns.

It is interesting to note that functional antheridia are usually present in the gametophytes of apogamous ferns. The sperms can, therefore, fertilise sexual plants and may even participate in hybridisation e.g. *Dryopteris x fraser-jenkinsii*. The literature is ambiguous about the production of archegonia, some authors suggesting that archegonia may be absent, rudimentary or normal, though the latter may not be functional, whilst others indicate that archegonia are not produced in any form (See Sheffield and Bell, 1987).

Obligate apogamous cycles have been found in a number of families although in a few genera only, such as the Schizaceae *(Anemia),* Adiantaceae (eight genera including *Adiantum, Pellaea* and *Pteris)* and Dryopteridaceae (four genera including *Cyrtomium* and *Dryopteris).* In these genera apogamy is confined to a few species. Some of the more primitive families, such as Marattiaceae, Osmundaceae and Cyathaceae, are not recorded as having any apogamous species (Walker, 1966 and 1979).

It is estimated that approximately ten per cent of all homosporous fern species are apogamous (Walker, 1966). What is the value of such a life cycle? It is still a mystery but it is singificant that of the known apogamous ferns a high proportion are polyploid with several sets of chromosomes per nucleus, many being triploid (three sets of chromosomes). Due to the difficulties which arise in the reduction of the number of chromosomes at spore formation many polyploids are sterile and it is possible, therefore, that an apogamous cycle may be a means by which an otherwise sterile hybrid may continue to reproduce. Indeed, the majority if not all obligate apogamous ferns are sexually-sterile hybrids formed by the crossing of two species (Lovis, 1977).

It has also been suggested that apogamy may be a means of completing the life cycle in regions of unreliable water availability as it avoids the need of water for fertilisation. Some desert and semi-desert ferns are apogamous, but not exclusively so, and many apogamous ferns favour damp habitats.

Another advantage that apogamous ferns appear to have is that, in general, their gametophytes mature and produce sporophytes more rapidly than those of sexual species, the difference often being of several weeks. This early maturation gives them a competitive edge over sexual species in their habitat and, as with the freedom from water for fertilisation, may be an advantage in more xeric conditions (e.g.Wagner, 1974).

Some Concluding Comments

Apomixis is a term used for "reproduction without fertilisation, the sexual process being wholly or partly lost" (Winkler, 1908). Vegetative reproduction and apogamous life cycles are types of apomixis, as are apospory and parthenogenesis. A common feature of apomictically produced individuals, irrespective of the method by which they are produced, is that they have the same genetic constitution as the parent plants, and one of the

advantages of apomitic reproduction is that well-adapted and tried combinations of characters are perpetuated. Other advantages are that otherwise sterile hybrids can reproduce as can species at the edge of their range when environmental conditions may reduce and even prevent normal reproduction occurring, e.g. at high altitudes or in shady conditions. Apogamous life cycles have a further advantage, that of producing a dispersable unit, the spore.

The disadvantage of apomixis is that the variability shown by offspring resulting from out-breeding, and of importance in the survival of the species under conditions of long term environmental change, does not occur. There are obvious advantages, therefore, to plants which can reproduce sexually as well as apomictically. It should be pointed out, though, that due to the occurrence of random mutations, limited variability does develop over a long period of time in populations of plants reproducing by apomixis only.

Note:

Research workers dislike the expression "apogamous ferns" and two other terms are preferred in the literature, namely "apomitic ferns" and "agamospory". As the expression "apogamous ferns" is in common usage among fern growers, it has been used in preference to these other two terms.

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SHORTER NOTE

Spore Exchange

I would like to thank all the people who have helped me since taking over as Spore Exchange Organiser, but especially Mr. Cartwright whose excellent advice and guidance have been invaluable. I would also like to encourage more people to contribute to the scheme, particularly members growing British fern varieties. Even small amounts of uncommon species and cultivars are particularly welcome. The spores can be sent at any time of year, but should be clearly named, with source if possible (i.e. country of origin, wild-collected, home-grown etc.) and date of collection, and securely packaged. Feedback from the Exchange is always welcome, particularly on naming unidentified species and correcting errors.

MARGARET NIMMO-SMITH
Spore Exchange Organiser, 201 Chesterton Road, Cambridge CB4 1AH

THE SPORTING HABITS OF POLYPODIUM INTERJECTUM 'CORNUBIENSE'

ROBERT SYKES

Ormandy House, Crosthwaite, Kendal, Cumbria LA8 8BP

This is the story of a genetic adventure – everybody else has known all about it for 120 years but it astounds and delights me.

In 1980 I organised a meet in the Lake District which was richly attended by Martin Rickard and Jimmy Dyce and practically no-one else. Jimmy in his report in the *Bulletin* mentions our visit to Fred Jackson's "small but very choice fern collection" in Stonethwaite, Borrowdale. Fred had a small plant labelled *Polypodium interjectum* 'Trichomanoides': as nearly as I recall, it resembled Fig. 2b on the attached photocopies. It had on it one fertile pinnule which Fred generously gave to me. I sowed the spores in two small pots and I have been watching their progress with parental pride for the last seven years (things move slowly in my fern house).

Their variety of form is prodigious. About half were normal, and I record with some regret that I threw them out: it would have been interesting, on reflection, to breed from them. The photocopies show a selection of the forms produced. They can be divided into five groups:

1. Divided crest and pinnae ('Bifido-cristatum'). (Fig 1a).
2. Relatively foliose, progressively divided from a simple bipinnate form to tripinnate with quadripinnate leanings. (Fig. 1b).
3. Pinnules very wide, richly forked and crested. No two pinnae are the same. (Fig. 1c).
4. Highly crisped. (Fig. 1d). This variety is rather similar to 'Jean Taylor'.
5. Finely divided, narrow pinnuled tripinnate forms. I was rather surprised when I came to analyse the range for this article that all these finely divided examples are covered by that description as their appearance varies considerably. (Fig. 2b).

Subject to normal frond variation each plant is broadly consistent within itself, though all, I think, throw normal fronds and occasional mixed fronds.

Most fronds are infertile, but some in forms 1 and 2 bear sporangia: time will tell if they are viable.

The photocopies flatten them dreadfully. The basal pinnae on many of the fronds are turned upwards rather than forwards so they are very three-dimensional in appearance. That is particularly so of form 5 which is beautiful and symmetrical in the flesh but looks a mess in reproduction. Each sub-pinnule on 5 uncurls separately so there is an enchanted moment when the developing frond is fringed with little globules.

Most are rather small. 2 is selected from a smaller plant but the others are representative (No. 1 is 15cm. long). I suspect I have not grown them very well. I will try harder in future.

I am assuming that they are all in the group *Polypodium interjectum* 'Cornubiense'. Reginald Kaye in Hardy Ferns says of 'Cornubiense': "It has the odd habit of producing finely cut tri – to quadripinnate fronds, normal fronds, intermediate fronds, and fronds incorporating all forms in the one frond."

That made me go back and look at my clump labelled 'Cornubiense', which I now find does not fit; it is illustrated on the front cover, and opp. p. 230. It has consistent and very beautiful sub-tripinnate fronds plus normal and mixed fronds which I have always taken as the tell-tale of the variety. No sign of the finely cut fronds.

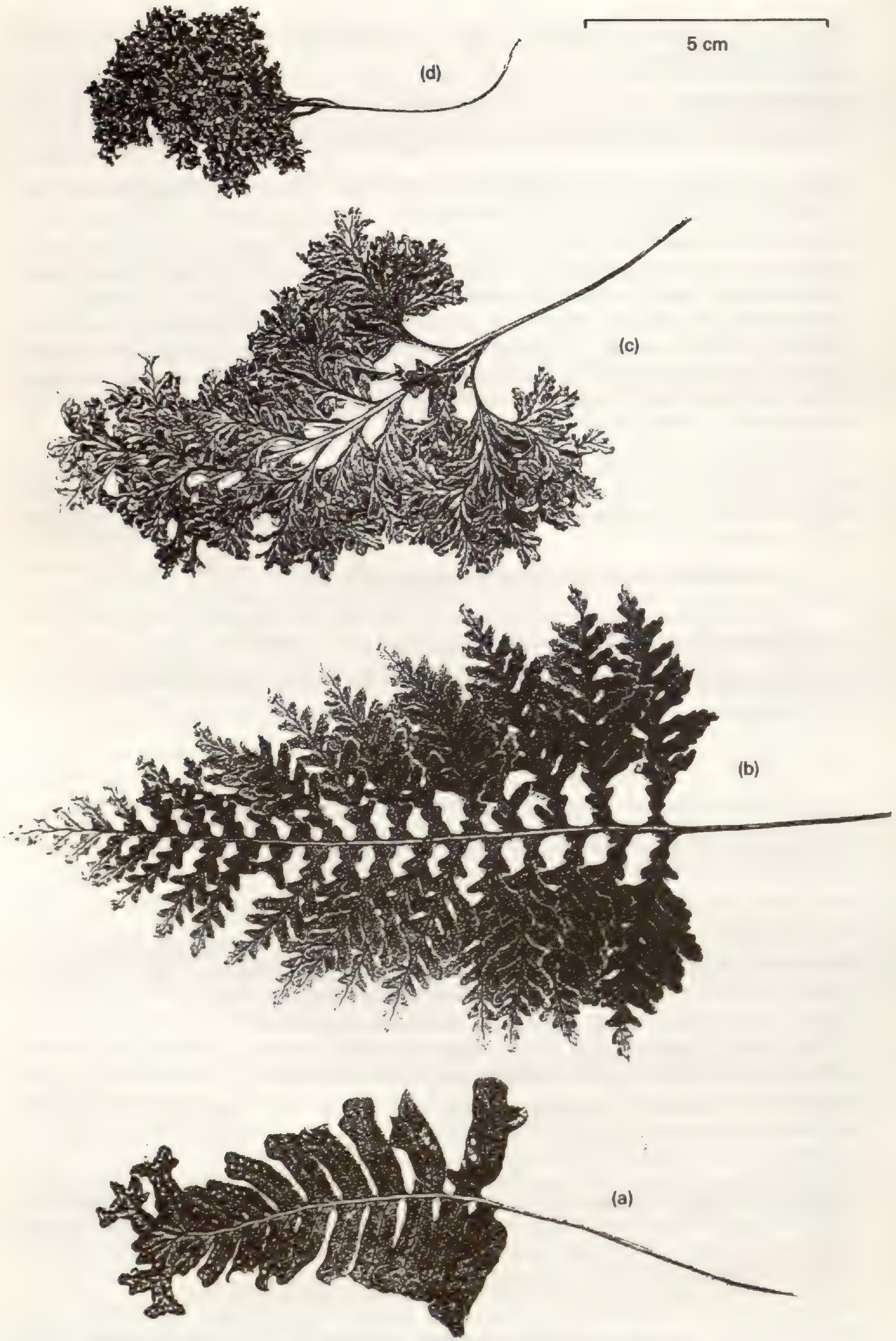

Fig. 1. Varieties of *Polypodium interjectum*.
(a) Form 1. 'Bifido-cristatum'. (b) Form 2. (c) Form 3. (d) Form 4

Fig. 2. (a) *Polypodium vulgare*? 'Trichomanoides'.
(b) Variety of *Polypodium interjectum*?, Form 5

Of the other authors I have looked at, only Chas. T. Druery has anything useful to say. *Choice British Ferns* (1888) (the only book with an illustration, but too generalised to be helpful), *The Book of British Ferns* (1901) (given to me, I recall with gratitude, by Jimmy and Martin after that memorable week) and *British Ferns & their Varieties* (1910) each contains some information. I summarise it as follows:

1. 'Cornubiense' was first found by Rev. C.B. Whyte (lucky man) in Cornwall in 1867. It was also known as 'Elegantissimum' or 'Whiteii'.

2. Druery mentions the habit of "producing indiscriminately three kinds of fronds viz. perfectly normal ones; very finely cut ones consisting of tripinnate or even quadripinnate, very narrow segments; and a coarser type of these". He describes "the coarser type": "the pinnae subdivided into long, blunt-pointed segments".

3. "The spores invariably yield the same inconstant form" but "the improved forms were all, we believe, raised from divisions"

4. He says that 'Cornubiense' and 'Trichomanoides' are too closely akin to be separately described but distinguishes them in two respects: 'Cornubiense' is the parent of 'Trichomanoides', but in 'Trichomanoides' the intermediate coarser type fronds do not appear.

5. How was 'Trichomanoides' bred?
   "In this, we believe by constant suppression of the normal fronds, an almost constant form has been arrived at by Messrs. Backhouse of York, only showing the finest cut type with very little reversion; very beautiful".

I find quite extraordinary the suggestion that by constantly removing one type of frond one would somehow train the plant not to produce them. The great authority is apparently only reporting what he was told; dare I say that I do not believe it?

One always hopes, when sowing varieties, to grow forms other than the parent plant. In that sense my results are unremarkable. Nevertheless, they interest me because of the wide range of beautiful and distinctive forms and because my experience differs from what I would expect from these sources in several respects:

1. Druery distinguishes three types of frond (normal, coarser type and finely cut). His 'Cornubiense' has all three. His 'Trichomanoides' has the first and the third. My existing 'Cornubiense' plant has only the first and the second.

2. The progeny of my sowing, though showing the three types described, do not show all three on the same plant, – or not clearly and not yet.

3. The spores do not "invariably yield the same inconstant form". In particular there is no mention of the simple crested form (1) nor the more elaborate foliose forms (3 & 4), and there is a wide range within the more characteristic fronds.

My only regret is that I did not grow plants and put these thoughts together a little faster. Fred never knew what his gift yielded. I think he would have enjoyed it.

Footnote:
Your editor should really be writing this. His observations on my article illuminate some problems – and raise others. He distinguishes three plants (and he has them all):

A. "Original" *Polypodium interjectum* 'Cornubiense' which is the three frond form found by Whyte and described by Druery and others. (This was the form grown by Fred Jackson, not Trichomanoides'. Ed.)

B. "Common law" 'Cornubiense' which is what I and apparently lots of others have had for years, with only the coarser form and normal fronds.

Polypodium interjectum 'Cornubiense' – 'common law' form
(Photographed by Christopher Potts)

Asplenium Scolopendrium 'Crispum' fertile form, probably 'Crispum Moly' (Photograph by Christopher Potts)

Fred Jackson with Margaret Rothwell and Rosemary Merryweather (centre) at Castle Crag, Cumbria c.1975.
(Photograph by James W. Merryweather)

Polyprdium vulgare agg. 'Ramosum' (garden cultivated) but originally from wall at Grange in Borrowdale.
(Photograph by Christopher Potts)

C. 'Trichomanoides', which is even more finely divided than "Original" 'Cornubiense' (see Fig. 2a); he thinks that it is a form of *P. vulgare*. "If so" he writes "all Druery's attributed sources must be wrong – unless it is a hybrid based on *P. x mantonii*".

Either A or B above should be renamed: perhaps we should revert to one of the synonyms mentioned by Druery 'Elegantissimum' or 'Whiteii' for the original form. That leaves the question where forms B and C have come from. Having seen the range in my sowing my guess is that they were derived from spores of form A rather than by division.

SHORTER NOTE

Fred Jackson (1901-1987)

As reported in last year's Bulletin, Fred Jackson (see photo opp.), one of our Vice-Presidents, died on the 7th of May 1987. Living most of his life in Borrowdale in the Lake District, in some of the best fern country in Britain, he was often lured out onto his native fells to study the wild flowers, rocks and, of course, ferns. Not surprisingly, over the years, he found several notable ferns, species and varieties, while at the same time supporting the local conservation lobby.

He was the first person to record *Dryopteris submontana* from the northern Lake District – high up on Honister Cragg, adjacent to the quarry where he worked. Unfortunately, the quarrying operation eventually destroyed the habitat. He was also the first to find *Dryopteris expansa* in the Lake District (and therefore possibly in England?) on the western slopes of Glaramara.

His most outstanding find, however, was the fifth British record of *Asplenium x murbeckii,* and only the second record this century (See *British Fern Gazette,* 1961, Vol. 9, p.49). Fred was aware that *A.x alternifolium* had been recorded from Borrowdale and when he spotted a curious little spleenwort high up on Castle Crag he hoped he had re-established the record. It was only accessible by real rock climbing but, eventually, with the aid of his son Jim, Fred was able to collect material. He was initially disappointed at it not being *A.x. alternifolium,* but in fact he had, of course, found the much rarer hybrid. Subsequently, examination of old herbarium specimens revealed that *A.x. murbeckii* had earlier been recorded in Borrowdale (in 1927), the only other English record (See *British Fern Gazette,* 1963, Vol. 9, p. 110).

Fred was also responsible for many fern variety finds, most notably his *Asplenium scolopendrium* (Cristatum group) 'Jackson' (See *Pteridologist,* 1987, Vol. 1, opp. p. 175). He was also associated with the very fine *Dryopteris filix-mas* 'Cristata Jackson', which is now quite widely grown. He was also aware of the branched polypod on the wall at Grange in Borrowdale (See photo. opp.), and he may have been the original finder. This locality which still exists (See *Bulletin,* 1987, Vol. 3, p. 113), is very close to the site of W.F. Askew's old nursery, from which it is possibly an escape.

Perhaps, living close to Askew's nursery was the trigger for Fred's interest in fern varieties. Certainly, in his younger days, he used to spend a lot of time helping Askew. Fairly recently, in 1980, he took a small group of B.P.S. members back to the site of the nursery, where we met Askew's daughter and toured the site.

Over the last few years Fred spent most of his time living with his daughter, Mary, on the Isle of Cumbrae, where he enjoyed the softer climate. His interest in ferns stayed with him and we exchanged many letters and, of course, ferns right up to within a month or two of his death. Indeed 3 days before he went into hospital for the last time, he was feeding the roses and tidying the ferns . . .

MARTIN RICKARD

BOOK REVIEWS

THE FLOWERING PLANTS AND FERNS OF THE SHETLAND ISLANDS by Walter Scott and Richard Palmer. 468 pp. + 26 pp. maps. 1987. The Shetland times, Lerwick: ISBN 0 900662 56 5.

Preparing any account of the flora of an area of the British Isles, be it parish or county, is a rewarding, stimulating and valuable exercise. In doing so the author/editors bring together much information, often collected by many others and over many years and lists the data in an orderly way according to an accepted botanical arrangement of the plant groups portrayed. This is a most effective way of data retrieval from the printed page and makes any local Flora a useful addition to a field botanist's library. And so it is with this Flora, but this is not just a compilation or a bringing together, even, of 30 years of personal fieldwork on the islands: it is also a scholarly appraisal of the taxonomy, ecology and distribution of the vascular plants of the Shetlands. Each species entry contains a gem of interest on its taxonomy, history, or ecology, or about the botanists who recorded it before.

The account of the pteridophytes is, like the rest, painstaking and very readable. *Osmunda,* now very rare and confined to islands in lochs, still survives although it is lost from Orkney. Bracken is local and *Asplenium trichomanes* has only been recorded as the subsp. *quadrivalens*. *Isoetes* may prove to be interesting; both *I. echinospora* and *lacustris* grow in the same lake in a number of localities, a situation which could lead to hybridisation – which we know occurs in France, and (very recently) possibly elsewhere in Scotland and the Lake District. In France (Pyrenees) this hybrid has doubled its chromosome number and formed a good sexually reproducing species which may occur here. The authors, true to form, are reviewing their sites with enthusiasm. *Polypodium interjectum* has not so far been found in Shetland but its hybrid with *P. vulgare* has. The book makes it clear that when we translated grid records for the BRC computer for the *Atlas of Ferns* (1978) we were often off beam. But Scott and Palmer have set the record straight.

This book is a classic and a must for any field botanist. For those contemplating a visit there is a Praegeresque "botanical itinerary through Shetland" which will give the basis for a fine holiday; there is something of interest to fern-lovers at almost every one of the 90 sites described.

A.C. JERMY

BRITISH FERNS by Ron Freethy: Crowood Press, 1987, 128pp. Price £10.95.

Reviewing books is usually a pleasure, but in this case it was not. This in undoubtedly the worst modern book on ferns that I have ever read. It is a mixture of chatty prose and attempts at detailed descriptions that rambles and jumps from one topic to another, often unrelated, one. The text is riddled with misleading remarks, botanical inaccuracies and incorrect descriptions of species. Several Latin names are out of date, others are incorrect and the author has committed the most heinous crimes by constantly referring to *Dryopteris felix-mas, Athyrium felix femina* and to cryptograms. The book also includes outrageous remarks about the state of present knowledge in pteridology that show what little grasp the author has of the subject. The line drawings are of an appallingly low standard and the colour plates are a set of the crudest paintings of ferns that I have ever seen in press.

My advice is short and to the point. Do not buy this book.

B.A. THOMAS

ASPLENIUM SCOLOPENDRIUM 'CRISPUM'

MARTIN RICKARD
The Old Rectory, Leinthall Starkes, Ludlow, Shrops. WY8 2HP

Most fern growers recognise *Asplenium scolopendrium* 'Crispum' as one of the elite kinds of fern variety. Equally, most realise that the differences between the forms are not always easy to pinpoint and, as a consequence, these plants are quite often referred to simply as 'Crispums'.

The crispum character is when the frond "remains entire but is deeply pleated or goffered up each margin, with the undulations, in the best forms, so deep and close together as to resemble the ruffed collar associated with the Elizabethan period of dress". - Jimmy Dyce in *BPS Newsletter,* No. 10, p. 20, 1972. Most first class crispums are sterile but some forms are occasionally fertile. Fertile crispums differ from the variety 'Undulatum' by not being fully fertile, having a thinner texture and by being more heavily pleated. There is, however, a point of transition between the two forms which can make matters rather difficult sometimes!

So far as I can discover, *A. scolopendrium* 'Crispum' was first described as *Scolopendrium vulgare* var. *crispum* in *A Natural Arrangement of British Plants* by S.F. (or J.E.) Gray in 1821. Much earlier, J. Bauhin and J.M. Cherler described *Phyllitis crispa* in *Historia Plantarum Universalis* 1650-51. It would be very interesting to know if this is the same variety.

Today, several distinct classes of crispum are recognisable, i.e. basic (or original type), fertile, broad, tall, narrow, fimbriate, sagittate, variegated, muricate and cristate forms.

Basic type

This was the true crispum as originally described by Gray. It was not particularly broad, nor tall, and lacked any other distinguishing character apart from being a very good regular, sterile crispum. By a process of elimination it might therefore be possible to conjecture at the identity of this variety today! It has been found several times and it is hard to believe that none of these finds survive. In shape, it would resemble Fig. 1a, but the blade would be more strongly crisped. To date, this is the nearest I have seen to the original form. However, be aware that many named forms need to settle down in cultivation before they produce typical fronds; accordingly, while small, or when grown in unfavourable conditions, they may tend to look like this basic type. I notice this particularly with some of my plants of 'Crispum Bolton's nobile'. I have not seen the more recent wild finds by Tony Worland (1973), Peter Corbin (1974 etc.) and Bob Trippitt, but it seems likely that they are each similar to the original form. I hope they are still in cultivation.

Broad forms

The earliest broad form was 'Crispum latum' found by C. Jackson. It is a true sterile crispum with the lower part of its broad blade separated from the rest by a short contracted or depauperate interval. This variety may turn up, but there is one better known example of the broad type of crispum - 'Crispum Bolton's nobile'. Nine years ago I was fortunate in being given a possible plant of this by our member Robert Bolton, a descendant of the original grower T. Bolton (see *Brit. Fern Gaz.* Vol. 2, p. 77, 1913). Today the plant is doing really well and a good frond is illustrated in Fig. 2a. This compares well with a photograph of this variety in the *British Fern Gazette,* Vol. 7, p. 210 in 1948. I should add, however, that not all fronds develop to this extent; in fact, only when grown on a limestone rubble do I get such full development.

Another broad form is 'Crispum grande Wills' which is more difficult to locate today. A frond illustrated in Fig. 3a fits the description of 'Wills' by being more deeply ruffed,

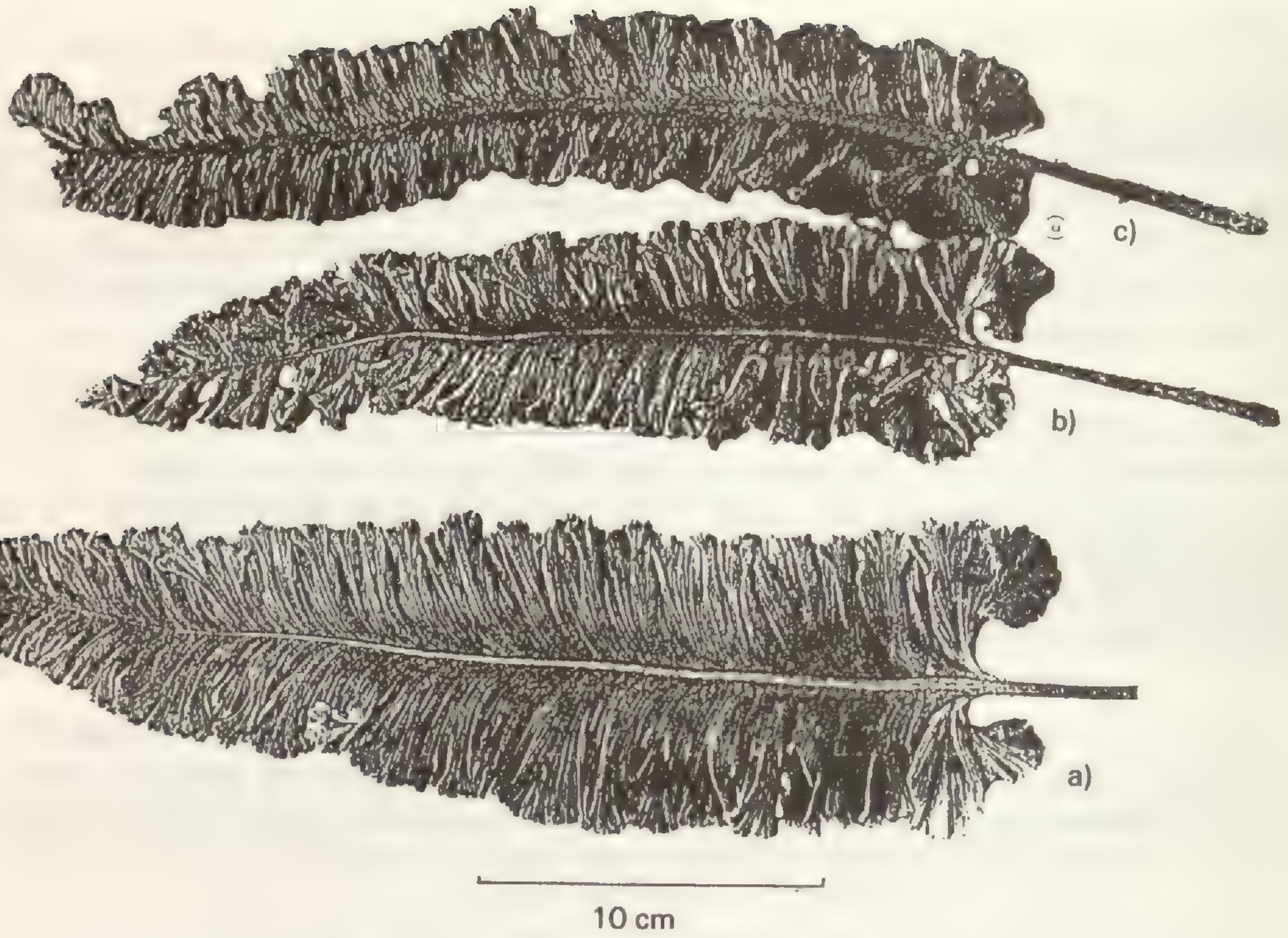

Fig. 1. Forms of *Asplenium scolopendrium*
a) 'Crispum fertile', possibly 'Crispum Moly',
b) a narrow form of crispum. c) 'Crispum muricatum'

Fig. 2. Forms of *Asplenium scolopendrium*
a) 'Crispum Bolton's nobile', b) 'Sagittato-crispum', c)'Crispum speciosum Moly'.

with a more rounded apex, than Bolton's form. It also resembles Druery's illustration in his *The Book of British Ferns* (1903), but this plant is sparingly fertile and I can find no reference to 'Crispum Wills' being fertile! This variety grows well in Oxford Botanic Gardens.

Another problematical broad form is 'Crispum Robinson's broad form'. Plants exist in collections under this name, but I have not yet seen a characteristic frond.

Of more recent origin, we have yet another broad form in cultivation, *A. scolopendrium* (Crispum group) 'Kaye's Splendour', depicted in Fig. 4b. Not only is this broad but it is also very tall, a marvellous new break that Reg Kaye has raised from 'Crispum Moly'.

Fertile forms

Some crispums are fertile when mature. As young plants they are often sterile and thin-textured and indistinguishable from normal crispums, but once spores start being produced the crispum character becomes somewhat diluted, with the goffering more irregular and shallow, see Fig. 1a. 'Crispum Moly' is today reckoned to be a sparingly fertile crispum, and it is probable that the frond in Fig. 1a is from this variety (see also photo opp. p.230). It is not a well documented form, but Cranfield mentioned some fine *A. scolopendrium* 'Undulatum' in Moly's collection *(Brit. Fern Gaz.* Vol. 1, p. 254, 1912), and maybe one of these is the plant we now know as 'Crispum Moly'.

Some of the forms of crispum described below are also sometimes fertile, e.g. 'Fimbriatum', 'Drummondiae' and 'Crispum muricatum'.

Tall forms

Several old forms fit into this category, e.g. 'Crispum Stablerae', 'Crispum Keall' (with a very dark midrib), 'Crispum Stansfield' (= 'Crispum imbricatum' of Lowe) and 'Crispum speciosum Moly'. Of these only the last is known to survive today. It is illustrated in Fig. 2c. It is very heavily crisped and flushed with slightly variegated bars running, here and there, from the midrib to the edge of the frond; these do not show up in the figure. In the *British Fern Gazette,* Vol. 1, p. 254, 1912, W.B. Cranfield refers to a robust broad crispum beautifully marbled with white called 'Crispum Moly's splendens'; apart from apparently being a broad variety, the description fits 'Speciosum', and I wonder if there is any connection – particularly as Cranfield makes no mention of 'Crispum speciosum Moly' in his article.

Once again we have modern additions to this section. Reg Kaye has raised *A. scolopendrium* (Crispum group) 'Kaye's superb' (see Fig. 4a), another magnificent form raised from 'Crispum Moly'. We also have a wild find to add, namely the very fine crispum found by Christopher and Mary Potts in Cheddar Gorge (see *Pteridologist,* Vol. 1, p. 61, 1985).

Narrow forms

Fine narrow fimbriate crispums have been raised from time to time, one such being illustrated in the *British Fern Gazette,* Vol. 7, p. 210, 1948. None of these seem to be in cultivation today. The narrowest form of crispum I have yet seen is the one shown in Fig. 1b. This form was discovered as several large clumps in a garden at Horning in Norfolk during a BPS excursion in 1979.

Fimbriate forms (lacerated frond margins)

Numerous fimbriate forms have been raised in the past, the best being 'Crispum fimbriatum Stansfield'; see the illustration opposite page 1 in Druery's *Book of British Ferns* (1903). This magnificent form is never seen today; however the fimbriate character is still with us as shown in Fig. 4d. This frond was sent from a plant grown out-of-doors by Reg

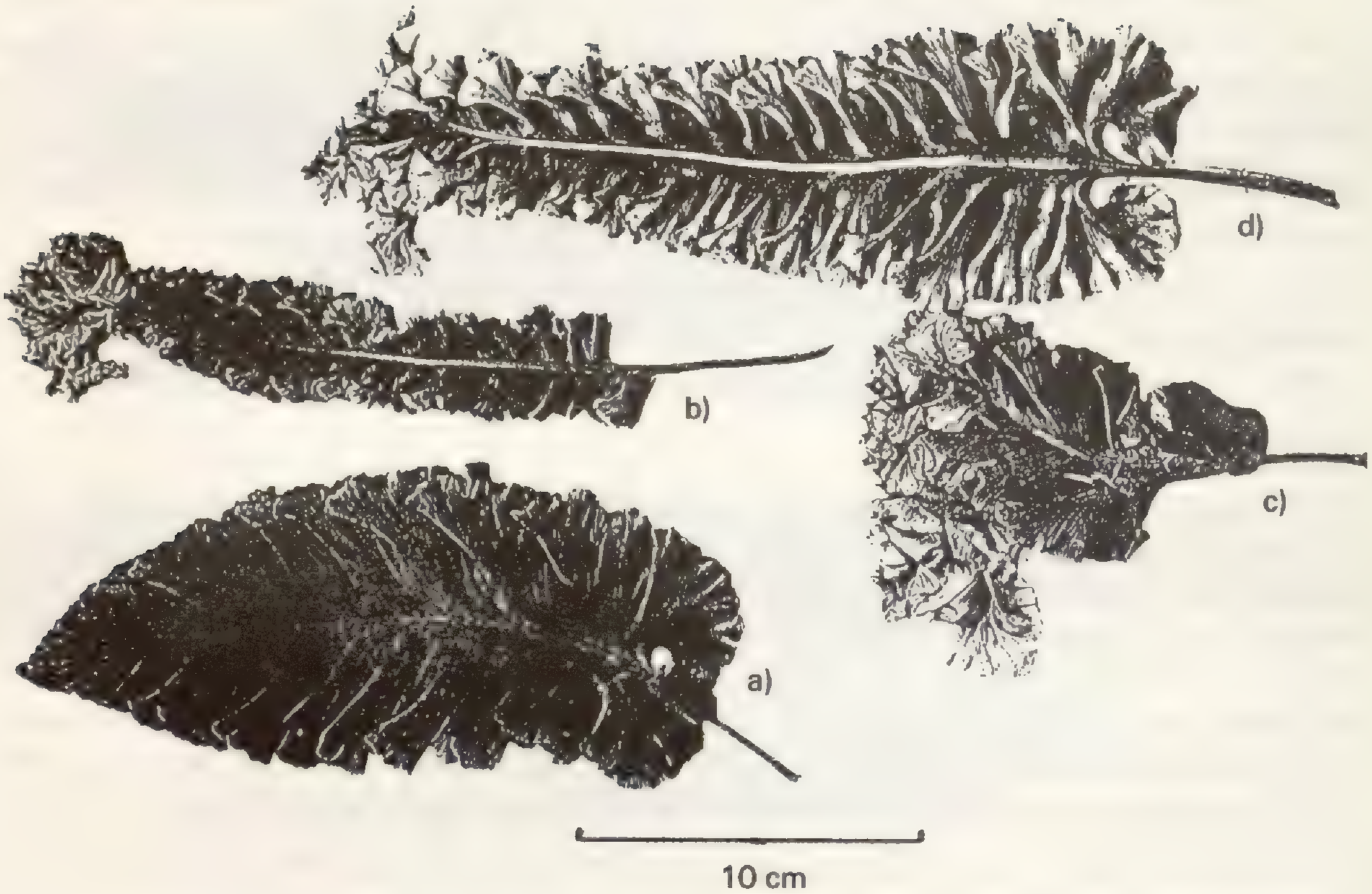

Fig. 3. Forms of *Asplenium scolopendrium*
a) a broad fertile crispum, possibly 'Crispum grand Wills',
b) 'Crispum fimbriatum Bolton', c) a ramose crispum, d) a crested crispum

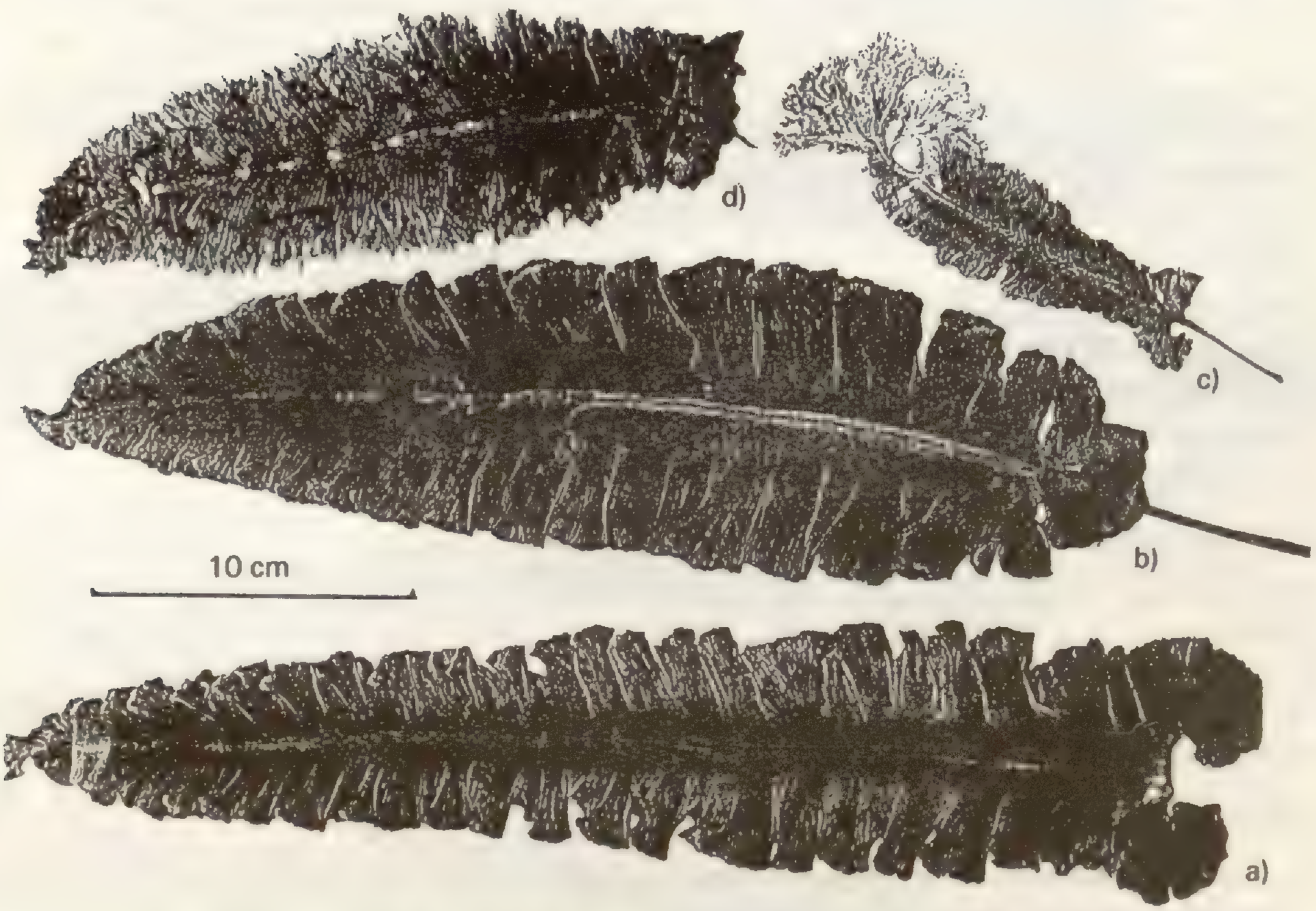

Fig. 4. Forms of *Asplenium scolopendrium*.
a) (Crispum group) 'Kaye's superb', b) (Crispum group) 'Kaye's splendour',
c) 'Crispum Drummondiae' or progeny. d) 'Crispum fimbriatum'.

Kaye; it does not seem to be comparable to Stansfield's form, but F.W. Stansfield has commented that as plants mature they lose the finely divided aposporous condition. Fresh batches can, however, be raised from spores. (F.W. Stansfield annotations in his copy of *British Ferns and their Varieties* by C.T. Druery, 1910).

Sagittate forms (winged at base)

This is not an exciting section. The frond illustrated in Fig. 2b is fairly typical, but as the sagittate character is rarely visible in a strong growing plant, it tends to be a bit pointless – except to the purist! The frond illustrated here compares well with the 'Sagittato-crispum' shown by Druery in *British Ferns and their Varieties* (1910) on page 453. This variation is not to be confused with the many magnificent brachiate forms of *Asplenium scolopendrium* in cultivation, which are not crispums.

Variegated forms

I have already mentioned 'Crispum speciosum Moly' (Fig. 2c) which is slightly variegated. There are, however, better examples where the frond can be almost entirely yellow. 'Crispum golden queen' is probably the best known, and the best form; it is, unfortunately, very scarce. My plant was divided recently and the two resulting crowns are not identical – one resembling 'Speciosum Moly'. Such an outcome only serves to confuse and, to be honest, I am hoping that next season it will revert to typical 'Crispum golden queen'. In its true form it does not show any marked character other than the heavy overall yellow colouring.

More recently, Philip Coke has raised a whole series of variegated Harts-Tongues. Many members will have seen them in his old garden at Stinchcombe. I was fortunate in that Philip gave me two plants from his crispum clones. One is a slightly variegated fimbriate form and the other a heavily variegated muricate form. Both are fertile. Apparently the variegations on Philip's plants have not been stable in some members' gardens but, here in Herefordshire, in a semi-open position, they have proved constant and very distinct. At the height of summer, however, in prolonged sunny periods, the creamy yellow patches do tend to burn an ugly brown.

I have not illustrated any of the variegated varieties (except 'Crispum speciosum Moly') as the variegations do not show up in black and white prints.

Muricate forms (raised lumps on frond surface)

'Crispum muricatum' was first raised by E.J. Lowe when he crossed a fertile crispum with 'Muricatum'. When the Society visited Lowe's garden in 1979 we found a large clump of 'Crispum muricatum' and, fortunately, some of us collected some frond bases and have, as a result, now got this variety in more general cultivation (Fig. 1c). Sadly, Lowe's plant is no more; when the Society revisited the garden in 1986, the area where it grew had been completely cleared and no sign of it could be seen anywhere else. This is a fertile variety and possibly more correctly classified as an 'Undulatum'. Philip Coke's variegated muricate crispum, mentioned above, is also fertile.

Cristate forms

Crested crispums are not often grown. Many consider the crispum form alone is enough, as it produces a marvellous symmetrical plant without the embellishment of a crest. I am sure this is right, but there is definitely room for crested crispums among the more ordinary types in my garden!

The best form is 'Crispum fimbriatum Bolton'. This is only slightly fimbriate (Fig. 3b). It is a neat, uniform and sterile variety with rather narrow fronds, very attractive in my opinion. The other form illustrated (Fig. 3d) turned up in a local garden centre. It is less attractive than Bolton's form but is very distinct. I have not been able to trace

a variety quite like this in the old literature. Reg Kaye grows two other unnamed forms which came from Kirkby Lonsdale gardens. They are fertile with long undulate fronds bearing small terminal crests. At home here or in the fimbriate section is 'Crispum Drummondiae'. This variety was found wild in 1861 near Falmouth. Today it is possibly extinct but Reg Kaye still has a plant which he acquired from the Whiteside collection under this label; this may indeed be the variety or progeny of it (Fig. 4c). Grown out-of-doors, this plant does not seem to be a first-rate variety but, grown under glass, it might approach closer to the 'Drummondiae' character. As found originally, 'Drummondiae' was a narrow fronded crispum with wide branching heads to the fronds. It was inconstant, however, with some perfectly normal fronds, while others were fimbriate. A good frond is illustrated on page 443 of *British Ferns and their Varieties* by C.T. Druery (1910). Slightly different forms were raised from the original by apospory and the plant now grown by Reg Kaye may be one of these.

I have never come across a ramose crispum until this year when examining some of my sporelings. One young plant (see Fig.3c) is producing a remarkable ball of foliage, and in time it could prove to be very distinct.

Perhaps having read this far, you feel I have omitted a variety you grow, or know of, still living somewhere. If so, I would be delighted to hear of it, whether it is a newly raised crispum or better still, an old one still in cultivation.

SHORTER NOTE

Advertisements for Ferns at the turn of the century

Among old herbarium sheets I have come across half-pages of British newspapers offering garden ferns, native and other, for sale. Readers may be interested in the species and varieties listed and in the owners of the nurseries involved.

The Church Times, April 19, 1895 *Trade Notices:*

HARDY LAKE DISTRICT FERNS:
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WILLIAM HARRISON, Sepulchre, Kendal.

The Church Times, October 26, 1906 *Trade Notices:*

Ferns,- 33 exquisite Irish and Killarney varieties, hardy plants, 1s.6d., free. 20 ivies (varieties), 6d, free; 30 lovely BULRUSHES and PAMPAS GRASSES, 1s.4d., free,
Miss Bennett, Prospect, Roscarbery, Cork.

The British Weekly, April 6, 1905 *Wants Column:*

Ferns,- 33 exquisite Irish and Killarney varieties, hardy plants, 1s.6d. free 20 ivies (varieties) 6d., free. 15 Honeysuckle plants, 1s., free.
Miss Bennett, Prospect, Roscarberry, Cork.

(In the above advertisements, the spelling and punctuation and use of capitals is as in the original. In today's currency: 6d = 2½p, 1s =5p, 1s. 4d. =6.7p, 1s. 6d. = 7½p, 2s. 6d. = 12½p, 5s. = 25p, 9s = 45p).

M.J.P. SCANNELL
National Botanic Gardens, Glasnevin, Dublin

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PTERIDOLOGIST

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Material for publication should be sent to J.A. Crabbe
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Editor of the Pteridologist: M.H. Rickard, The Old Rectory, Leinthall Starkes, Ludlow, Shropshire, SY8 2HP
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The BRITISH PTERIDOLOGICAL SOCIETY was founded in 1891 and today continues as a focus for fern enthusiasts. It provides a wide range of information about ferns through the medium of its publications and available literature. It also organises formal talks, informal discussions, field meetings, garden visits, plant exchanges, a spore exchange scheme and fern book sales. The Society has a wide membership which includes gardeners, nurserymen and botanists, both amateur and professional. The Society's journals, the *Fern Gazette, Pteridologist* and *Bulletin,* are published annually. The *Fern Gazette* publishes matter chiefly of specialist interest on international pteridology, the *Pteridologist,* topics of more general appeal, and the *Bulletin,* Society business and meetings reports

Membership is open to all interested in ferns and fern-allies. **SUBSCRIPTION RATES** (due on 1st January each year) are Full Personal Members £10, Personal Members not receiving the *Fern Gazette* £7 50, Student Members £5; Subscribing Institutions £12. Family membership in any category is an additional £2 Applications for membership should be sent to the Assistant Secretary (address above) from whom further details can be obtained. (Remittances made in currencies other than Sterling are £1 50 extra to cover bank conversion charges). Airmail postage for all journals - an extra £3.50, **or for those not receiving the *Fern Gazette*** £2.50.

(Front cover *Asplenium trichomanes* subsp *pachyrachis,* left-hand frond var. *harovii,* three right-hand fronts probably var *trogyense*)

Back numbers of the *Gazette, Pteridologist* and *Bulletin* are available for purchase from P J Acock, 13 Star Lane, St Mary Cray, Kent BR5 3LJ, from whom further details can be obtained

EDITORIAL

The deadline for copy for the *Pteridologist* each year is the 31st December. This season there was once again a shortage of copy at this date, but too much material by March. Could authors, therefore, please attempt to get items for publication to the Editor by the 31st of December each year. The chances of publication in full are much greater! Please also remember the maximum length for text in any one article is four sides, with the occasional exception of invited papers.

In this issue, locked deep in Christopher Frazer-Jenkins *Letter from Hawai'i*, is a competition with a very worthwhile prize. Do not miss it!

MISSOURI BOTA

AUG 23 1

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JACK BOUCKLEY
209 Woodfield Road, Harrogate, N. Yorks. HG1 4JE

It was in July 1980 that I received a packet of Adder's Tongue spores and without any hesitation I sowed some of it in various places in my garden and the remainder into a pot of sterilised compost which was put into a polythene bag.

In September 1983 the pot was examined closely for the first time since the spores had been introduced and there was no growth of anything on the surface, so the pot and contents were left out of the polythene bag and put in a corner of my garden among other pots of seeds and spores which seemed to be useless.

During the warm spell of weather in April and May 1987 I decided to tidy up this corner and as I was knocking the compost out of the accumulated pots I picked one up which was covered with grass, bitter cress and a small dandelion. I gave it a sharp tap to loosen the contents and about half left the pot and landed on my hand and it was then that I saw a rhizome which did not belong to any of the weeds. The handful was carefully put back in the pot and when I started to remove some of the weeds which had grown I came across a label marked Ophioglossum vulgatum 7/80. A couple of months after, two fronds were produced both of which had fertile spikes - seven years after the spore was set. It was kept in the pot until it started to die down and then it was planted in open ground in my garden on a patch where rhubarb had grown for many years until a few months before. This year (1988) it produced three fronds but only one had a fertile spike. It grows in the company of a sedum and *Poa seminifer (P. x semptlandica* I believe).

Since the original setting I have read in C. Page's *Ferns of Britain and Ireland* page 67, that prothalli of this plant are subterranean and that association with an internal mycorrhizal fungi is necessary for the well-being of the plant, so it would appear that the golden rule of sterile conditions for spore planting cannot be correct with *O. vulgatum* and that the prothalli, or gametophyte generation, if it had started growing in its first three years in sterile conditions (spores could be washed into the soil by condensation drips), could not have developed had I left the pot in the polythene bag, and that it was only when it was exposed to the elements that some weeds grew, died, rotted and formed a fungus, thereby prompting the prothallus into producing its second (sporophyte) generation.

Of course, this latter part is just deduction and it would be very interesting to know what the thoughts of the experts are regarding this matter.

THE PTERIDOPHYTES OF RADNOR – A SMALL MID- WALES VICE-COUNTY

R.G. WOODS
Nature Conservancy Council, Deauville, Spa Road, Llandrindod Wells, Powys, LD1 5EY

At the request of the Radnorshire Society, I put together an account of the fern and fern-allies of this little known and visited mid-Wales vice county. Nine years ago, I began to compile information on its plants in the hope of perhaps providing Radnor with its first flora. The work still goes on, the account of its ferns published in the Transactions of the Radnorshire Society for 1987 being the first fruits or spore of this project.

The earliest records traced appear in the Transactions of the Woolhope Naturalists Field Club, an extraordinarily active Club from Herefordshire. To make the earliest record of all in 1867 they hired their own train, had the railway company erect a temporary station and even allowed the ladies to attend "by special ticket". Having found Wilson's filmy fern in the "awful ravine" of the Bach Howey near Aberedw they appeared to successfully exterminate it, as it was never seen there again. Their excursion to Aberedw in 1871 provided the only reasonably certain record of green spleenwort. It too was never seen again. So fern recording started in a style which was kept up into the Victorian age. In 1906 F Hodgson published for WJ and JO Bufton an "Illustrated guide to Llandrindod Wells". Llandod, as it is locally known had appeared like a mushroom in the late 1800s as a fashionable watering place. The visitors apparently took the ferns as well as the waters. The Buftons got the Rev Wentwort Powell to contribute a section on ferns to their book. Whilst conceding that Radnorshire was "well supplied with ferns" he declined to say where they might be found as "the destruction among ferns has of recent years been so great that I have thought it better not to notify their exact habitats ... there is something lamentable in the way ferns have disappeared from the neighbourhood of Llandrindod". He was fortunately not totally secretive and lets slip that "there is a hill, almost in sight of my house where a few years ago the parsley fern was so abundant that the farmer mowed it for stable litter. Now there are only a few straggling specimens left". Did he really mean *the* parsley fern? Had bracken become so rare on this farm that they were forced to resort to cutting parsley fern? We may never know. There were no other certain records for this fern in Radnor until 1988 when it was found twice, to the N and W of Rhayader, well out of the Rev Powell's view. Whatever the depredations amounted to, 9 out of the 12 species of fern noted as occurring within 2 miles of the town in 1892 still survive and the ubiquitous sheep has taken over where the fern collector left off.

Three clubmosses, five horsetails and twenty eight species of fern still occur in the county. Sheep seem to have significantly reduced the abundance and extent of the fir, stags horn and alpine clubmosses but all can still be found in the Elan Valley area. Amongst the horsetails the great horsetail has suffered a dramatic decline, being in the thirties frequent in the upper Ithon Valley, an area where suitable looking habitat persists but not so the horsetail. It survives in only three sites. The wood horsetail is very much a plant of unimproved upland hay meadows where it thrives with other typical woodland plants such as bluebell and wood anemone.

Adderstongue and moonwort are scarce but widespread. About half a dozen new sites were discovered in 1988. Their abundance in many sites varies greatly from year to year.

Royal fern occurs in four sites. Pony grazing in recent years has taken a considerable toll on its Rhosgoch Common population, the largest in the county. Bracken covers vast areas of common land, provoking regular outcries of anguish from the farmers. Large areas are still baled annually in the early autumn for stable litter.

Despite its loss from the Bach Howey gorge, Wilson's filmy fern keeps a tenuous hold in the county in 6 sites, mostly in the North West uplands. Summer droughts and hard winters regularly scorch fronds; but regrowth, if mostly stunted, seems to just about make up the losses.

Within the marsh fern family, mountain and beech ferns occur widely in the uplands, but marsh fern was last seen 110 years ago by Miss E Armitage on Rhosgoch Common near Painscastle. This large raised mire with a well developed willow carr was recently acquired as a National Nature Reserve by the Nature Conservancy Council. The habitat looks ideal for the fern but the large areas of willow swamp with exciting and unpredictable water field holes make survey difficult. Perhaps a member of the Society might rise to the challenge. After all, Miss Armitage found it in her long skirts without the aid of wellington boots.

Rock outcrops and walls everywhere suit the spleenwort family but the lime loving species on native rock are mostly confined to the base rich mudstones of the SE and the small outcrops of limestone and dolerite at Dolyhir and Stanner, near Kington where the Rusty-back fern has its only native rock localities. These base rich rocks also suit the brittle bladder fern which in two sites sports its most spectacular rust fungus, *Hyalopsora polypodii*.

Much further work is required on members of the male fern family. The subspecies of *Dryopteris affinis* require a complete reappraisal in the light of recent taxonomic opinion. The mountain male fern shows every sign of being more widespread than the three present records from the NW uplands suggest. Narrow buckler-fern is common in wet woodlands, bogs and damp hedgerows and its hybrids are expected but have not yet been discovered.

Hard shield fern is about twice as abundant as soft shield fern, extending into drier habitats whilst oak fern occupies two distinct habitats - ledges and screes in the uplands of the west where it cowers away from the ubiquitous sheep and ungrazed acidic woodlands in the east.

Limestone fern was last seen at Aberedw in the Wye Valley by H N Ridley in 1884. Much suitable habitat remains and a search for both it and green spleenwort in these magnificent gorge woodlands is a high priority.

Hard fern is ubiquitous as is polypody but much work is required to elucidate the status of the 3 species recorded, together with their hybrids. *Polypodium cambricum* is so far only known from Stanner Rocks, where it was seen by Peter Benoit. Perhaps the most interesting and significant fern appears at the end of the account - pillwort. On an international scale it is Radnor's rarest higher plant. And Radnor does it particularly well. So far 27 sites have been found, mostly in mud bottomed ephemeral pools on the large areas of common land in central Radnor. Taken with the sites just over the vice county boundary across the Wye in Brecknock, this mid-Wales population must be second only in extent to that of the New Forest and of international importance.

As I hope the above account makes clear Radnor seems to be a fern-rich county and one well worth a look at. In trying to produce a county flora that embraces also the bryophytes, lichens and even the rusts and smut fungi in an area with barely a single resident active field botanist the critical groups have suffered. Any records of ferns from Radnor would be welcomed, but particularly of polypody, ssp. of maidenhair spleenwort and scaly male fern, together with any specimens of fern rusts, or offers of help in determining same.

FERNS WITH OTHER PLANTS

A.R. BUSBY
Croziers, 16 Kirby Corner Road, Canley, Coventry, CV4 8GD

To the dedicated fern enthusiast a border composed entirely of ferns is a great achievement and gives much pleasure; however, it must be admitted that this form of planting lacks much imagination. A border of ferns will furnish the garden during the summer but as many British ferns are deciduous, the average fern border looks drab during the winter.

The experienced fern grower quickly learns that to ensure colour and interest all the year round, other plants must be incorporated in a planting scheme.

Of course, ferns can be used to underplant trees and shrubs, taking advantage of any light or dappled shade as long as the situation is not too dry. Steps should be taken to incorporate plenty of humus in the form of peat, leafmould or well-rotted compost into the top three to four inches before planting. Even with this, watering will still be necessary during the driest spells, especially on light sandy soils.

Let us consider ways of incorporating ferns with other plants to provide interest during the winter months.

Ferns and bulbs

For the grower who still wishes to exhibit his ferns in one border or area, then winter and spring flowering bulbs planted amongst the ferns will give a show when the fern fronds are absent. Naturalised daffodils planted in groups in the centre or at the back of the border will mask the bare fern root-stocks from March to early May. When the daffodils have finished flowering, they can be dead-headed which will tidy the border. During the essential six to eight weeks following flowering when the bulbs are building up for the next spring's flowering, the fresh greenery of the developing fern fronds will largely mask the untidy daffodil leaves. Around the edge of the border, other low growing bulbs such as *Iris reticulata* and its varieties, *Leucojum vernum, Galanthus nivalis* and the various forms of *Narcissus* species display themselves well. Do not be afraid to include plantings of the excellent universal pansies in the larger bare areas. I would avoid mixing pansies of different colours which may prove too bright and garish but carefully select a variety such as Sutton's 'Light Blue' or Sutton's 'True Blue' which will provide a pool of a single pastel colour.

Universal Pansies are easily raised from seed in May or early June and most of the large seed houses list several varieties.

Ferns with Heaths and Heathers

An alternative scheme which I have tried successfully is to plant ferns with winter-flowering *Calluna, Erica* and *Daboecia*. On suitably acid soils, autumn and winter flowering varieties of *Calluna vulgaris,* such as the double pink 'H E Beale' or the lavender shade of 'Mrs Pat' can be used. Better still are those varieties providing coloured foliage and I thoroughly recommend c.v. 'Beoley Gold', 'Golden Carpet', 'Golden Feather', 'Multicolor', 'Orange Queen' and 'Wickwar Flame'.

For those gardeners on lime, the many varieties of the lime tolerant *Erica carnea* are ideal, such as the old favourites 'King George', 'Springwood White', 'Springwood Pink', 'Myretoun Ruby' and 'Pink Spangles'. Again, the foliage forms are favourites with me and I especially recommend 'January Sun', 'Vivellii' and 'Ann Sparkes'.

There are also varieties of *Erica x darleyensis, E. erigena* and *E. vagans* that are lime tolerant and will provide colourful foliage during the winter months.

No matter how thickly these heathers cover the ground, and they are the finest ground cover plants, our varieties of *Dryopteris* and *Polystichum* will push their way through into the light. I especially enjoy seeing varieties of *Dryopteris affinis* agg. pushing their yellow/bronze fronds thorough the undulating groups of heathers in the spring.

To keep the entire planting looking neat, it is necessary to remove the old fern fronds during the late autumn/early winter unless they are in good condition. Wait until the fronds have gone completely brown before removing them. Some species such as *Polystichum,* are winter green and I tend to leave them unless they are looking particularly tatty.

The cool shade provided by the heathers in the summer months on the fern roots enables us to plant ferns in sunnier situations that, perhaps, we would not otherwise consider suitable.

Ferns in the herbaceous border

We must not forget that stalwart of English gardening – the herbaceous border. Again, the cool shade provided by the leafy herbaceous plants will tempt us to plant our ferns with a more bold approach, but do remember to plant them in threes or fives, as individual ferns tend to get lost in a mixed border.

My winter border

! have a shady border that displays mainly *Athyrium filix-femina* and its varieties during the summer months; however, they quickly disappear in late autumn so they are interplanted with various forms of *Helleborus corsicus, H. niger* and *H. orientalis* hybrids. The front of the border is planted with *Cyclamen hederifolium, Primula veris* and *Galanthus nivalis,* providing plenty of interest while the ferns are at rest. I find that the robust shoots of the Hellebores provide shade, support and wind protection to the ferns in late summer.

One group of plants that my experiments in mixed plantings has led me to appreciate is the hostas. True, they too disappear rather quickly in the autumn but shady borders consisting of hostas interplanted with ferns are a real joy to me, and evoke fond memories of a cool shady border on hot summer days. (When? I hear you say!)

The final ingredient must be 'taste' and what suits one grower will not suit another. I trust that these comments will encourage others to experiment in their fern plantings. They do not always work but it's great fun trying and I look forward to reading other growers' experiences in future editions of the *Pteridologist.*

SHORTER NOTE

More Asplenium x sarniense in Guernsey

During a visit to Guernsey in March 1987 I found, growing with *Asplenium adiantum-nigrum* and *A.billotii* on a bank in a narrow lane near Moulin de Huet, King's Mills, a sterile *Asplenium* which suggested in its morphology the hybrid between the two, *A. x sarniense,* described by Anne Sleep in 1971. Though small and juvenile, Dr Sleep had no hesitation in referring two fronds I took to the hybrid. They resembled *A. adiantum-nigrum* in their deltoid (though narrow) outline, but *A. billotii* in their obtusely rounded pinna tips and distinctly stalked oval pinnules. This seems an additional site for *A. x. sarniense,* though falling within the same general area of south-west Guernsey as most of the previous records.

R.C. PALMER

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TWO SPLEENWORTS NEW TO BRITAIN - ASPLENIUM TRICHOMANES SUBSP. PACHYRACHIS AND ASPLENIUM TRICHOMANES NOTHOSUBSP. STAUFFERI

MARTIN H. RICKARD
The Old Rectory, Leinthall Starkes, Ludlow, Shrops. SY8 2 HP

For some time two subspecies of *Asplenium trichomanes* L. have been recorded in Britain, namely subspecies *trichomanes* and subspecies *quadrivalens* D.E. Meyer emend Lovis. Two further subspecies of *A. trichomanes* (subsp. *pachyrachis* (Christ) Lovis & Reichstein and subsp. *inexpectans* Lovis) known in continental Europe have not so far been recorded from this country.

One of these, subsp. *pachyrachis,* has recently featured in my correspondence with André Labatut and Michel Boudrie in France but I never really took more than a passing interest in what I guessed was an obscure subspecies that I was never likely to encounter. However, on holiday last year (1988) I visited André and Pamela Labatut at their home in Bergerac and among many ferny bits and pieces they showed me a frond of subsp. *pachyrachis*. It was immediately recognisable as a form I had seen before - in the Wye Valley in Herefordshire. In fact, I had collected a frond for my own herbarium of what, at the time, I thought was a distinct variety of *Asplenium trichomanes!*

My 1969 find was collected from humid vertical limestone rocks on the Herefordshire side of the River Wye just downstream of Symonds Yat. On my return from holiday I revisited the site as soon as possible and easily refound subsp. *pachyrachis,* abundant on the vertical rock faces, sometimes growing near *Polypodium australe*. I collected fronds from here and sent them, or showed them, to Prof. T. Reichstein, André Labatut and Christopher Fraser-Jenkins; all confirmed that this Herefordshire material was subsp. *pachyrachis* (see Fig.2). In the same consignment of fronds sent to Prof. Reichstein I included another curious form of *A. trichomanes* collected from among the subsp. *pachyrachis;* this he indentified as a hybrid - probably the hybrid between *A. trichomanes* subsp. *pachyrachis* and *A. trichomanes* subsp. *quadrivalens,* known as *A. trichomanes* nothosubspecies *staufferi* Lovis & Reichstein (see Fig.6). Christopher Fraser-Jenkins confirmed this independently. Therefore, at one site above the banks of the River Wye in Herefordshire we have two taxa new to the British flora.

Asplenium trichomanes subsp. pachyrachis

This is usually a distinct fern; most amateur botanists would recognise it as 'different'. It varies somewhat from locality to locality but it should be recognised from the following description (see also photograph opposite p. 246).

1. It usually grows on sheer limestone rocks or walls, often in shady niches (see phot. opp. p. 246).
2. The leaves tend usually to be pressed on to the face of the rock, spreading rather like a starfish.
3. Fronds often falcate or S - shaped, 2 - 12 (15)cm long x 0.5 - 2 cm wide.
4. Pinnae frequently triangular due to the extension of the lobes at the base of the pinnae on either side (i.e. biauriculate), and incised (thus serrato-lobate).
5. Pinnae attached to the midrib by the centre; in subsp. *quadrivalens* the attachment is usually by the lower corner.
6. Pinnae often rather crowded (i.e. subimbricate).
7. Stipe about 0.5 mm thick, brittle.
8. Rachis and abaxial side of pinnae (particularly at the base) often densely covered

Silhouettes of fronds of *Asplenium trichomanes*. Fig. 1 subsp. *quadrivalens,* Biblins, Herefordshire 1989. Fig. 2 subsp. *pachyrachis,* Symonds Yat, Herefordshire 1988 (det. TR & CRFJ), probably var. *subequale*. Fig. 3, 4 subsp. *pachyrachis,* Biblins, Herefordshire 1989 probably var *subequale*. Fig. 5 hybrid, Gwent 1989, probably nothosubsp. *staufferi*. Fig. 6 hybrid, Symonds Yat, Herefordshire (det. TR &, CRFJ), probably nothosubsp. *staufferi*. Figs. 7-15 subsp *pachyrachis* varieties as named in the herbarium at Kew (K). Figs, 7, 8 var *subequale,* banks of River Wye, nr. Monmouth, J.D. Enys 1856. Fig. 9 var. *subsequate/imbricatum,* Knaresborough, A. Clapham 1857. Fig. 10 var. *harovii,* Castle at Wentwood, J. Forster 1864. Fig. 11 var *harovii,* St Arvans, nr. Chepstow, G.S. Streatfield 1862. Fig. 12 var *harovii* (?var. *trogyense)* Castle, Monmouth, G.S. Streatfield 1863. Fig. 13 var. *harovii,* Caldicot Castle, Monmouth, Brooke-Smith 1872. Fig. 14 var. *harovii,* Barmouth, A.G. More 1863. Fig. 15 var. *harovii* (?var. *triangulare),* Clare, Stansfield 1863.

with nearly colourless hairs about 0.1 - 0.2 mm long (subsp. *quadrivalens* is usually hairless).

9. Chromosome number n=72, 2n=144. Tetraploid sexual.

The only fern subsp. *pachyrachis* could be confused with is subsp. *quadrivalens* (see Fig.1) but the above characters should easily separate these two.

Subsp. *pachyrachis* could, in fact, be quite widespread in Britain. Peter Edwards kindly sent me photocopies of extreme forms of *A. trichomanes* in the Moore herbarium at Kew. Several of these look to be varieties of subsp. *pachyrachis,* e.g. specimens from Black Head in County Clare, Barmouth in Wales, Knaresborough in Yorkshire, as well as from the Wye Valley in Herefordshire and Gwent (see Figs. 7-15). Most of these collections in the nineteenth century were made by variety hunters during the Fern Craze. This goes to show how distinct this fern can be – it also reinforces my respect for those Victorian fern enthusiasts who did not miss much!

The Victorians did not group all plants of subsp. *pachyrachis* as one taxon, instead different varietal names were given, for example:-

Asplenium harovii or *A. trichomanes* var. *harovii* Moore, first reported from France in 1842, see examples of British specimens in Fig. 10, 11, 13 & 14.
A. trichomanes var *trogyense* Lowe, found by Lowe 1882, see Fig 12 which was collected as var. *harovii* 17 years before Lowe named var. *trogyense*.
A. trichomanes var. *subequale* Moore, found by Enys 1855, see Figs. 7 & 8, probably typical subsp. *pachyrachis*. Identical to most modern collections – see Figs. 2, 3 & 4.
A. trichomanes var. *imbricatum* Clapham, found by Clapham 1863, see Fig 9.
A. trichomanes var. *velum* Lowe, found by Lowe 1890.
A. trichomanes var. *triangulare* Lowe, found by Stansfield 1863, see Fig.15. This specimen at Kew appears to be the type specimen of var. *triangulare* but it is named var. *harovii*.

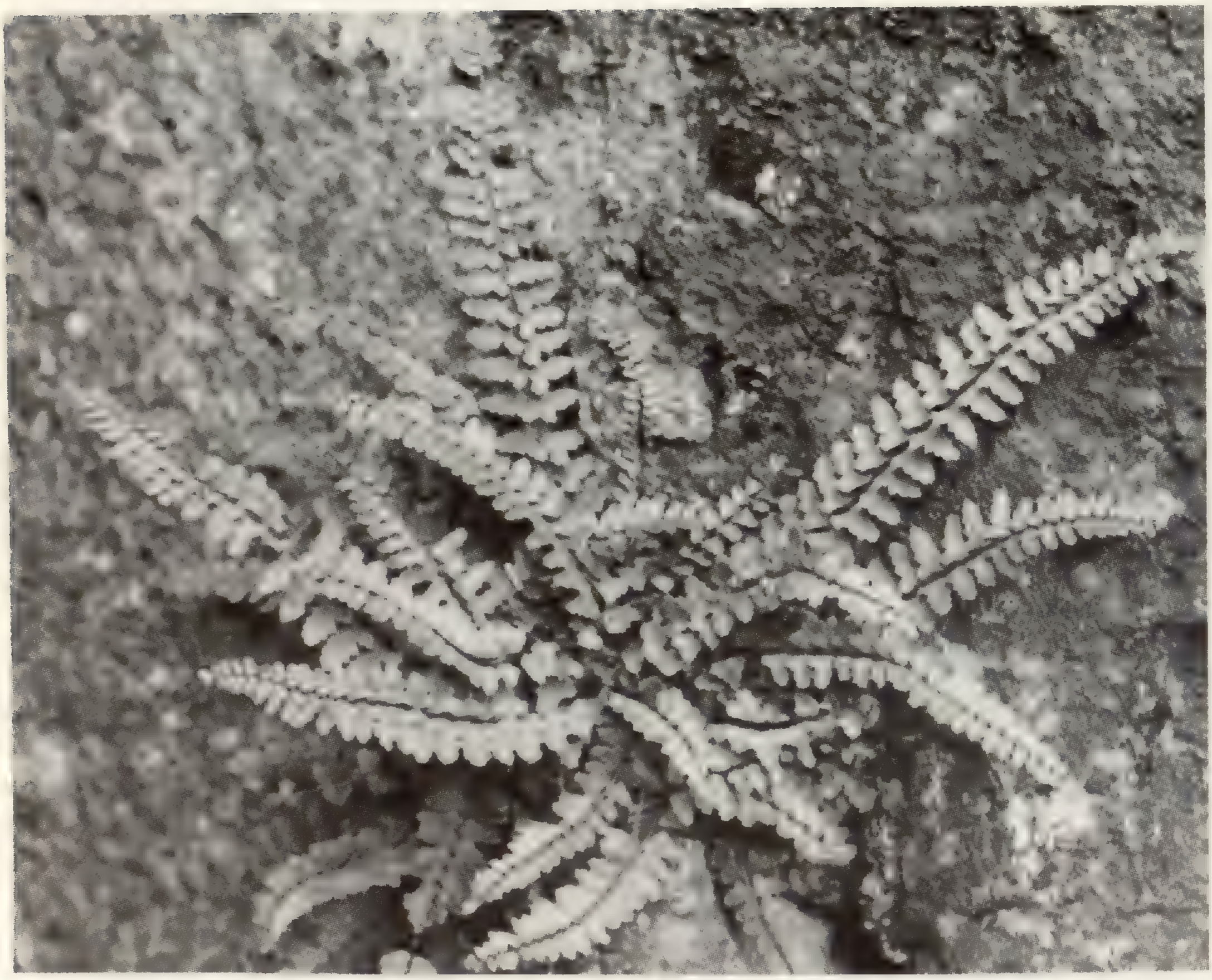
In addition I did think var *Moulei* Moore (see photograph opposite p. 279) might be a form of subsp. *pachyrachis* but Prof. Reichstein has checked it and determined that it is subsp. *quadrivalens*. All of these varieties are described in *British Ferns* by E.J. Lowe 1891, pp. 37-39, and many tally with the specimens in the Kew herbarium.

Clearly subsp. *pachyrachis,* in the form described as var. *subequale,* is fairly common in the region of the lower Wye Valley. Last autumn (1988) I also found it in Gloucestershire, while my son Edward found it nearby in Gwent, each time just above the River Wye. I also believe I might have seen it back in 1967 on the limestone at Smoo Cave on the coast near Durness in the far north of Scotland, but unfortunately I do not have a specimen. Confirmation by a local botanist would be very welcome! Limestone rocks occur in many parts of the country and lime mortar walls are common, therefore subsp. *pachyrachis* may well be found to be quite widely distributed.

More recently, this winter, armed with Lowe's book and the details of the Kew specimens it has been possible already to refind some of the Victorian forms of subsp. *pachyrachis,* although allocating the correct name is very difficult! A good form of var. *harovii* is common on the walls of Caldicot Castle in Gwent and a similar form occurs on nearby Chepstow Castle. In the same general area var. *harovii* thrives along with var. *trogyense* (see outside of front cover – confirmed as a form of subsp. *pachyrachis* by M. Boudrie). Var. *trogyense* is a beauty, but as its best site is at risk from overcollection, I cannot reveal the locality. Our original finds in the Wye Valley are var. *subequale* with some var. *imbricatum*. This only leaves var. *triangulare,* recorded from County Clare, and var. *velum* which have not yet been refound. It seems that var. *velum* is a more developed form of var. *trogyense,* which in turn is an improvement on basic var. *harovii*. The cut off point between these three varieties is unclear at present.

Asplenium trichomanes subsp. *pachyrachis* (var. *subequale?)* Wye Valley, Gwent, opposite Biblins.
Photograph by Clive Jermy, British Museum (Natural History)

Shaded vertical limestone outcrop. Typical locality for *Asplenium trichomanes* subsp. *pachyrachis* (var. *subequale?),* Wye Valley, Gwent, opposite Biblins.
Photograph by Clive Jermy, British Museum (Natural History)



Asplenium trichomanes subsp. *pachyrachis* (?var. *harovii*) on Caldicot Castle, Gwent.

Asplenium trichomanes nothosubsp. *staufferi,* Biblins, Herefordshire

Recent records for subsp. *pachyrachis:*

Vc 34 (W. Gloucester). Opposite Biblins, 1988, 1989 MHR - var. *subequale.*
Downstream of Symonds Yat East, 1989 MHR - var. *subequale.*
Vc 35 (Monmouth). Opposite Biblins, 1988 E. Rickard - var *subequale.*
Chepstow Castle, 1989 MHR - some approaching var. *harovii.*
Caldicot Castle, 1989 MHR - var. *harovii.*
'Gwent', 1989 MHR - vars. *harovii* and *trogyense.*
Vc 36 (Hereford). Doward Hill, 1969, 1988 MHR (det. TR, CRFJ & AL) - probably var. *subequale.*
Biblins, 1989 Lady R. FitzGerald and MHR - var. *subequale* plus some approaching var. *imbricatum.*

Note: The best place to see var. *harovii* is inside Caldicot Castle (see photograph opposite).

Subsp. *pachyrachis* is widely distributed in central southern Europe including France (Boudrie, 1988) and Luxembourg (Fraser-Jenkins, pers. comm.). It has been described as *Asplenium csikii* from Albania (e.g. see Tutin et al, 1964).

The above list of records poses some problems. Why does subsp. *pachyrachis* vary from site to site but remain fairly constant within sites? For example, the distinctive form, var. *trogyense,* occurs in the complete absence of normal subsp. *pachyrachis.* Also, why does subsp. *pachyrachis* grow on Chepstow and Caldicot Castles? These localities are sometimes sunny and relatively windswept - nothing like the humid rocks of the Wye Valley. Admittedly, the castle forms tend to differ from those in the valley. Are these two types of populations, therefore, simply ecotypes or are the differences more significant?

Asplenium trichomanes nothosubspecies staufferi (subsp. *pachyrachis* x subsp. *quadrivalens*)

The hybrid is more difficult to identify in the field, but useful characters are:

1. It is a vigorous plant with a more upright habit than subsp. *pachyrachis.*
2. It is distinctly intermediate between the parents with some slightly triangular pinnae, most of these pinnae attached to the midrib by the centre as in subsp. *pachyrachis.*
3. Fronds 15 - 30 cm long x 1.5 - 2.0 cm wide.
4. It is usually a darker green than subsp. *pachyrachis,* more like subsp. *quadrivalens.*
5. It has mainly aborted spores - the most reliable character.
6. Chromosome number 2n = 144.

I am surprised that Lowe and others did not recognise this hybrid as a distinct nameable form. Indeed, my initial field determinations based on its striking morphology have subsequently all been confirmed by the presence of mainly aborted spores. Lovis and Reichstein (1985) have shown that this hybrid may not be completely sterile as some apparently good spores are formed. Certainly, field evidence would confirm this theory as, at the site where var. *trogyense* grows, there are perhaps 20 plants of this hybrid (see Fig. 5). Most are thick textured like the subsp. *quadrivalens* parent but some plants are noticeably thinner in texture with crisped pinnae - although of equal frond length. Perhaps these plants are divergent forms of second generation hybrids?

Localities:
Vc 35 (Monmouth). 'Gwent', 1989 MHR - about 20 plants (see Fig. 5).
Vc 36 (Hereford). Doward Hill near Symonds Yat West, 1988 MHR - one plant, det. as hybrid by TR and CRFJ (see Fig. 6).
Biblins, 1989 MHR - 2 plants (see photograph opposite).

I have not uncovered any old records for this hybrid in Britain although I am suspicious that var. *majus* Lowe may include large forms of it. Var *majus* was found in the Wye Valley near Chepstow. This hybrid is also known in Switzerland, France, Luxembourg, West Germany, East Germany and Czechoslovakia.

Summary
This article is only a preliminary notice of the discovery of these two taxa in the British Isles. In the near future I hope a much fuller account will be published including the necessary cytological data on British plants and fuller distribution records. Any specimens of possible subsp. *pachyrachis,* or the hybrid, from additional localities would, therefore, be most welcome, but please do not collect plants. This applies particularly to the localities mentioned in this account. These colonies are long established but many are small and vulnerable to over collecting.

Good hunting!

Acknowledgements
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SHORTER NOTES

Centenary Year - 1991

The Society will reach its one hundredth year in 1991, so your Committee is actively considering various ways of celebrating the occasion and bringing the study of pteridophytes to a wider audience. There will, of course, be the usual programme of events during the year, but additional meetings are also being planned. There will be an international meeting on propagating and growing ferns at the Royal Botanic Gardens, Kew in July, 1991, which will attract pteridologists from around the world. This will be followed by a tour of some gardens with important collections of ferns. First circulars of both are included with this issue for you to register your interest.

We are planning a joint exhibit with the Royal Horticultural Society for the 1991 Chelsea Flower Show. Naturally, there will be our stand at the Southport Show and we expect to have an even larger number of fern exhibitors than usual.

An anniversary meeting might be possible at the same venue as the Society's inaugural meeting in the Lake District in 1891.

A special publication is also being planned to highlight the main aspects of the Society's work over the last hundred years.

Any suggestions from the membership covering the centenary year are most welcome, as indeed they are on any aspect of the Society. Your President and Committee try their best to give you the best Society they can, but they have precious little feedback from the membership as a whole.

BARRY A. THOMAS

TRIALS AND ERRORS ON FERNS FROM SPORES

PETER H. HAINSWORTH
Station House, Achnashellach, Strathcarron, Ross-shire IV54 8YR

I greatly enjoyed Tony and Enid Marriage's experiences on fern raising in the last *Pteridologist* and wondered if others would be interested to read of the fumblings of another newcomer in this field.

Ferns have always attracted me. I have childhood memories of Lady Ferns growing around the edge of a concreted London backyard, and their distinctive ferny smell when brushed against. I wasn't very high then. Perhaps it is the beautiful three-dimensional symmetry of those radial fountains of bilateral fronds. There are few things like it in Nature.

At Achnashellach, with its high humidity and even higher rainfall, ferns grow prolifically about the garden, even to the extent of becoming an endearing nuisance. But it took ten years of frustration in other fields of gardening before I realised that I was overlooking a wonderful asset. Why not grow ferns?

Inevitably the urge to extend the range of varieties led to thoughts of raising them from fern spores. Ferns in local garden centres were, in any case, non-existent. A few kinds of spores were offered in the seed exchange of the Scottish Rock Garden Club. Why not give them a try? In particular I remember *Adiantum pedatum* and *Polystichum munitum,* which were just sprinkled on my usual unsterilised seed compost topped with coarse gritty sand from the river. I was lucky, spores germinated. So did mosses. I spent hours weeding with tweezers. Prothalli came and later the first tiny fronds.

This, by the way, took place in the propagating case in which I start my plant seedlings. It consists of a Dutch light (2½ ft. x 5 ft.) over an insulated box with a 75 watt soil heating cable in sand and a 4 ft. daylight balanced fluorescent tube under the glass.

There was a little surprise in store – most of the first ferns potted up turned out to be our common *Dryopteris!*

The need for sterilising the compost was obvious and the need for a much wider variety of spores to choose from. Hence a subscription to the B.P.S. and an introduction to a whole new gardening world (and friends as well, more recently).

Out of 20 packets of spores sown in spring '85 on boiled earth-based compost, covered with clear plastic sheet in my propagating case, only three kinds came up. *Pteris cretica* 'Albolineata', *Athyrium filix-femina* 'Victoriae' and two plants of *Lygodium japonicum* (which went pale and slowly died). Later in the year one or two more plants each of three more species appeared, and in the wrong pots. With a couple of lovely mystery plants to balance up.

It seemed I had a lot to learn.

The next year I tried baking the compost in the oven. A Plantpak container was used with 24 compartments. This was stood in a plastic-lined seed-box with a pad of capillary matting, kept wet, in between. The surface of the compost, rather rough (I learned to avoid fine composts for seeds long ago - everything goes through a ½" sieve) was kept moist with a hand held mist sprayer. The compost was just standard 2 soil, 1 peat and 1 sand as used for seeds with a pH around 6.5.

Sadly, according to my records, 15 of the 20 species sown have the note "no germ." against them. A number of Male and Lady Ferns appeared. Lots of moss. Evidently the baking didn't work. Lots of tweezy weeding again.

In 1987 the compost was boiled again and topped with coarse, unwashed sand from

a quarry. I did not expect any weeds in this, coming deep out of the ground. But I wasn't prepared to see nothing at all, not even a weed, and a tuft of prothalli transferred as a test died after a fortnight. The sand proved to be extremely acid and was dark brown in colour. Suspected iron or aluminium toxicity.

In desperation I phoned the spore exchange manager who very kindly sent a second batch. These were sown at the end of April, on boiled compost again. Germination was extraordinary. Green in every pot. Too good to be true; in fact, six turned out to be weed *Dryopteris* again. But the other 15 were true, plus weeds. During the summer lots of the prothalli died away, often leaving just two or three around the edges of the pot. Suspected overheating. On several sunny days, even with shading it was 90F in the case and probably more under the plastic sheet. The propagating case is close under the roof of my workshop which is covered with transparent corrugated fibreglass sheet. In these latitudes it is difficult to find all day shade in midsummer, the sun only disappears for a few hours to the north.

Certain things grew fast. *Athyrium filix-femina* varieties, *Dryopteris wallichiana* and *D. marginalis, Polystichum setiferum* and *P. braunii* were pricked out by mid-August and most others by mid-September.

One thing was fairly obvious, spores germinate much better in the warmth and light of April than the cold dark days of February. I have since found that most spores seldom germinate at all below 60F. Though, I have sometimes wondered if the spores of some hardy species are like the seeds of many hardy plants and need a spell of winter chilling. Fresh spores of *Asplenium viride* and *Polypodium vulgare,* August sown, did not germinate until February and March although conditions appeared to be much better in August.

Results in 1988 were also good, sown in mid-February but otherwise similar conditions, nearly all pots germinating at various times in April. From the speed of development of some of the prothalli I became increasingly suspicious that all was not as it should be and awaited the first fronds with interest. When they came they all had hairy stalks and despite the labels, looked very much like those in the overcrowded compartment labelled *Hypolepis punctata*. These were carefully extracted so as not to disturb the other prothalli, and indeed *H. punctata* they all proved to be. And I swear I didn't breathe at all during sowing. This must surely be the fastest growing fern on earth – by September the plants had fronds up to 18" long and many were planted out in the garden. Fairly deeply in leaf-mould in the hope that frost will not find them.

A lot of prothalli disappeared during the summer and again I suspect overheating. Next year I shall put them in another place for the summer – but it has to be somewhere where they will not get overlooked for a day, and with a large garden that is not as simple as it sounds. There is always too much going on in early summer for my overloaded memory to cope!

An operation which I am having second thoughts about is the frequent overhead misting I have been giving the spores. They are so small and delicate that I felt they must have constant saturation to survive when germinating and kept them glistening moist. After no germination for five weeks (but with the temperature around 50F) I wondered if they were being drowned and stopped it. Sure enough, they were up in 3 weeks but it could have been rising temperature on this occasion. Another thing more to the point is that newly germinated spores have suddenly greatly reduced in numbers for no obvious reason since the last time I sprayed them a few days earlier. It seemed just possible that a sudden coating of fresh water might burst their delicate cells by osmosis. Another thought is that misting might be depriving the spores of mineral nutrients. Having negligible stores they must in some way absorb them very quickly. In nature their favourite places for germination are in cave mouths, wall and cliff crevices,

under large rocks and tree stumps, where there is relatively even temperature and humidity and moist substrate - but little if any overhead wetting. Under these conditions there will be a slow accumulation of mineral salts on the surface by the evaporation of soil water. A similar process to the more dramatic efflorescence on damp walls. Thus, a spore, if it is lucky, germinates in the midst of plenty. Rain or misting would nullify this. So in future we'll see what no spraying and only subsurface watering will do. Can anyone advise me?

When all else fails read the instructions (or go back to Nature). But the instructions in books generally are not comprehensive or consistent, and worse, do not tell us why. Having a somewhat scientific outlook, everything has to have a reason and if the instructions don't give one, and I can't see one, I believe they are suspect and don't follow them. Usually with benefit. Therefore I was very pleased to read fairly comprehensive details in the *Encyclopaedia of Ferns* by David L. Jones which came out last year, including a useful list of materials for making spore composts. Boiled mud seemed unsatisfactory from an aeration point of view. (But does aeration matter much at the spore stage? We are dealing with very small volumes anyway which soon stabilise). So I have been experimenting with peat sand mixes. I have my own peat bog from which I dig, dry and sieve my own peat, just the top fibrous 6". Although it is very acid, spores seem to like to germinate on it. This is sterilised in a large, flat, coarse food sieve, which just fits over a saucepan, so that steam is forced through it for 15 minutes with the saucepan lid on. There has been no trouble with weed *Dryopteris* and mosses from this. The quartz river sand (⅛" down) is boiled in the water below at the same time. To obviate dissension I use a kitchen reject. My only concern about these materials is that they are theoretically devoid of minerals.

Perhaps next year I'll get it all right, and by the year after will have forgotten exactly what I did and mislaid my notes.

The appearance of moss has always been a puzzle, usually in late summer when a whole patch or even pot erupts in mossy shoots. As though, like couch grass, it had been busy spreading underground before sprouting. Time to read up the moss's life history. A moss, I discovered, develops from a spore as a filamentous alga, colonising a patch and then, when it is ready, sends up shoots at random all over the patch. Problem solved. Dark green and black gelatinous algal skins on the compost were largely cured by sterilising the water containing vessels with bleach (well rinsed afterwards). The water itself comes from a constantly flowing deep spring in the garden and is not suspect.

Another little mystery is that some batches of prothalli are very slow to (or even never) send out a leaf. They get plenty of misting. Damage through overheating is a possibility. There is a batch labelled *Polystichum makinoi* with prothalli now over ½" across, but only three reluctant leaves have appeared and not from the large ones. Is the sexually active stage a fairly brief affair not repeated? Is it precipitated by the size of the prothallus, time from germination or external conditions? Perhaps, contrary to tradition, overhead misting should stop here too. Condensation of moisture is often clearly visible on the undersides and should be more than sufficient. But condensation would depend on there being at least some temperature fluctuation.

Feeding of prothalli and young sporelings seems an obvious thing to do and almost homeopathic doses seem to work. I use Vitax Cucumber Feed which contains trace elements as well as the major ones, all of which could be short in a peat sand compost. A match head size heap in a half-pint mist sprayer seems effective. The feed made from seaweed might be even better. Young ferns, when rooted, get a feed at about half strength. They don't seem to need much. As a friend of mine put it "I don't know what they live on".

While a weak feed works wonders I lost a lot of sporelings from time to time, with dead roots, and tracked it down to the use of John Innes Base fertilizer. Evidently too strong for them. Ammonia toxicity, no doubt, from the hoof and horn meal therein. A good mix, I found, was one part soil, one of garden compost and one of coarse sand. Well aerated, nourishing but not intoxicating. When they get to the potting stage they go into the standard 2:1:1 mix with about 4 "pills" of slow release (6 month) fertiliser around the edge of the pot halfway down. The hope being that the roots would take it or leave it as they need it, rather than being totally and unavoidably immersed in fertiliser. In practice it seems to keep them going indefinitely.

Impatient to get these plants to maturity I keep them growing all through the first winter with 15 hours artificial light daily. Natural light here can be discounted for three months. The temperature fluctuates rather wildly between 40-60F according to outside conditions. I am hopeful that a bit of extra insulation will improve this and even-out the humidity too. Even Athyriums, normally quick to die off in autumn keep going and by April growth starts to speed up again. I am sure one gains the equivalent of a season's growth like this.

In spring the youngsters are ejected to the greenhouse where they sit on capilliary matting over concrete slabs. They are shaded if need be by a milky white plastic sheet which can be dropped in front of them, and in summer a grapevine overhead gives them the sort of shade they need.

Now you know at least as much as I do. Has anyone else any thoughts to add on ferns from spores?

FERNS IN MEDICINE

BRIDGET GRAHAM
Polpey, Par, Cornwall PL24 2TW

The giant pharmaceutical manufacturers continue to pour out new wonder drugs in ever increasing quantity. But despite the claims made for their performance, there is a growing disquiet in the mind of the public, that research into the after effects is not as thorough as it should be, and that all too often the patient is saddled with another problem. As more and more G.Ps turn to a prescription for tablets as the quickest way of diminishing the glum-faced crowd in his waiting-room, the voice of another lobby is heard increasingly loud in the land. It is that of the 'back to Nature' group. They cover a wide field of interests and concerns, as wide as Nature herself, animal rights, protecters of threatened species and rain forests etc, and believers in herbs and plants as safer medicine than synthetic and chemical products.

The argument that the old remedies in herbals and Materia Medica just do not work, can never be effectively settled until there is agreement on the reaction between the phyche and the soma. We are left with the proof of the herb or tablet to be in the swallowing. There are a great many books, ancient and modern on natural medicines, but ferns have been grossly neglected, often not even mentioned. Yet for about two millenia they have supported and comforted the human race in all manner of sickness, and are still used by many unsophisticated peoples in these last years of the twentieth century.

I invite members with any of the following complaints to give the appropriate pteridophyte a chance, before reverting to taking a pill of unknown antecedents. The ferns were usually prepared as infusions or decoctions, when taken by mouth, as lotions to be applied externally, or made into an ointment or paste, which latter could be spread onto a poultice.

Dryopteris filix-mas has always been associated with its use as a vermifuge in Europe since pre-historic times. It is still used as such in Scandinavia but so also is *D. carthusiana* and bracken. In each case it is the rhizome which is prepared, though in the instance of *Huperzia selago,* (also still used in Europe), it is the spores that are suspended in solution.

Together with the above four pteridophytes, three of which are used to-day in the U.S.A. there are another eight species used in South Soto (South Africa) and they are widely favoured still in India and China. Among the species taken in Soto are *Asplenium adiantum-nigrum, Cystopteris fragilis,* and various species of *Polystichum.*

There is a wide choice of ferns to relieve dysentery and diarrhoea. In South Soto there are two species of *Cheilanthes* , elsewhere, the *Encyclopaedia of Ferns* lists *Asplenium adiantum-nigrum* (truly a fern of great versatility), *A. trichomanes,* and also *Adiantum capillus-veneris.* The last named is another fern that appears to have great healing potential. Two clubmosses are also reputed to be effective in controlling diarrhoea, *Lycopodium microphyllum* and *L. cernuum.*

Should you be suffering from head or chest complaints, there are several remedies to hand, *Ceterach officinarum, Cheilanthes hirta,* and the creeping root of the common Polypody; once again the black spleenwort *(Asplenium adiantum-nigrum)* is included. It might be as well to take a daily dose of this old friend throughout the winter as a phrophylactic. A lip-fern is also prescribed for the common cold and for sore throats. To prevent the onset of bronchitis, many African tribes make a syrup of sugar with one of three species of maiden-hair. I have tried this, using *Adiantum capillus-veneris;* it is perfectly inocuous and, so far, I am quite well. Spores of *Lycopodium* may be sniffed up, after the manner of snuff. The fronds of two spleenworts are smoked in South Soto to relieve asthma, and those of *Pellaea calomelanos* are inhaled. There is no information as to whether these habits could become addictive.

Urinary complaints as ubiquitous as the ferns themselves. There may be a link between a common ailment and a commonly-to-be-found remedy. The people of South Soto again, favour the spores of clubmosses and the root of the polypody. The *Encyclopaedia of Ferns* includes the inevitable black spleenwort once again, together with seven other species. There are four species with laxative properties, one of which is *Asplenium trichomanes.*

Ferns have been used to treat cases of diseases of the liver since the days of Dioscorides; indeed, it was he who bestowed the name 'Asplenium', not on our 'adiantum-nigrum', but on what is now rechristened as *Ceterach officinarum.* The taxonomy was corrected by de Candolle, around the middle of the last century. It means 'without spleen', which is puzzling. I don't know what is the active principle, or the action on the liver. Malaria was, of course, rampant in the Mediterranean in the past. One symptom was an enlarged liver; it was to reduce the swelling that the fern was prescribed.

Only the *Selaginella dregei* is listed as being effective in treating venereal sores. The fronds are dried, powdered, and incorporated with fat to make an ointment. This is still used in Zimbabwe.

The Malaysians continue to apply the useful *Lycopodium cernuum* for rheumatic complaints. Clearly this clubmoss rivals black spleenwort, maidenhair and bracken as a drug-of-all trades. These four deserve a place in the medicine cupboard of every household.

Lycopodium cernuum can also help in cases of under nourishment. Though the Chinese prefer *L. clavatum,* in mediaeval Europe *Osmunda regalis* was the first choice. Two other Osmundas were brewed as tea, all were said to alleviate the pangs of hunger.

After drinking the infusion, the patient was laid on a mattress of the green fronds. There is no information as to whether the sufferer awoke satisfied, or still hungry.

Pellaea calomelanos grows in Africa, Madagascar and India, and also in Spain. Hence there is a chance, should any member be afflicted with boils or pimples while on holiday in that country, of finding the natural remedy. The alternative is *Ophiglossum polyphyllum,* a small Adder's Tongue, which could be hard to locate. The *Pellaea* is also given to children, crushed in milk as a tranquiliser.

There is sound sense in linking the clubmosses with respiratory troubles, since they do contain three alkaloids which stimulate breathing, but paralyse the nervous system.

Ferns have been resorted to over the centuries to relieve the effects of sprains and bruises. The most easily come by for those at home, is *Asplenium marinum.* Four tropical species are listed, which are said to numb the pain. One is still used frequently in Java and Sumatra, and is also effective as a blood coagulant. The mild anaesthesia is produced by chewing the pinnae. Both the clubmosses and *Ophioglossum vulgatum* have a reputation of causing the blood to congeal. But if bitten by hostile insects, it is suggested that the sufferer chew the stipe of *Lygodium circinatum,* drink a decoction of *Oleandra neriformis,* or, back to our panacea, sip a tumblerful of maidenhair tea.

Both the scales of *Cyathea* and *Dicksonia* are held to be coagulants. Other natural anthisans are the rhizomes of two exotic ferns, or the juices of *Equisetum.* This claim can be tested by even the most timid members; another anti-irritant is the juice of young bracken tips rubbed on the bite.

Pteridophytes are also used in veterinary work. The Zulus insert a rather long lip-fern into a cow to help free the placenta. Horses with worms or parasites are given enemas made from a decoction of the rhizomes of a species of *Polystichum.*

There is but one survivor used in the products of the giant chemical companies today. *Lycopodium clavatum* is a component of the water-proof coating of pills. The spores are ground to a yellowish powder, which contains nearly 50% oil, and resists moisture. The familiar white sugar covering is applied to that surface. It is a clubmoss again, which is represented in the cosmetic trade. *L.cernuum,* native of the Antilles and Surinam, is an ingredient in bath scents. In the latter country this clubmoss is said 'to be able to charm'. This is all too tantalising. Whether the charm works if the bathwater be only mildly impregnated, or whether the charm is favourable or hostile, or even of its powers of duration, there seems to be no information.

For all members, be they curious, hypochondriacs, or courageous trend-setters, there is an open invitation to experiment, even to escape from the doubtful tyranny of the tablet.

I raise my glass of Maidenhair tea to the very good health of you all.

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LETTER FROM HAWAI'I

CHRISTOPHER FRASER-JENKINS
71 Abingdon Road, Oxford, OX1 4PR

Hang the pressing – tonight I write! So, sitting at a large open window with the tropical night air, the breathing of the sea, just outside, here I am having supper in the local restaurant, pen in hand, thinking over the findings of the last few days I've spent on the beautiful island of Maui. The silhouette of the coast and mountains of west Maui lies just opposite across the bay, cut off above, as always, by dense cloud, and seen through waving palm-leaves. But the table-top decor before me happens to be a map of the world seen from the Pacific, Hawai'i in the centre; and between, during and around my oh-too-American meal I am lost in thought on the world-wide distribution patterns of ferns, of *Dryopteris,* the genus I have studied for almost as long as I can remember. How can it be, how can it possibly have occurred that a form of the hay-scented fern (European – not *Dennstaedtia,* the American one), *Dryopteris aemula,* so well-known to me from the Canary Islands to Scotland, is here in Hawai'i, large as life and abundant everywhere in the cloud-zone of the volcanoes at about 4000 feet up? Its affinities have been unrecognised for a hundred years under the local name *Dryopteris glabra,* and though I had known some time ago that *D. glabra* looked similar to *D. aemula,* I never dared suggest it was really related when I prepared a monographic classification of the world's *Dryopteris* a few years ago in case it was only a superficial resemblance. But now, for the last three days, I've been up in the forest on Maui (which is the richest Hawai'ian island for ferns), and I've seen what I could hardly believe – abundant stands of superb and well-developed *D. aemula*-like plants growing in the masses of thick moss-clumps anywhere the light penetrates the misty, tangled branches of the "fairy moss-forest" around the middle altitudes of the dripping-wet northern slopes of the island. Here, at a latitude of 21°N, just within the tropic of Cancer, roughly level with Hong Kong and Taiwan to the west, south-central Mexico, Jamaica, and across the Atlantic to the Cape Verdes and ultimately to the same level as central India to the east, all places with more tropical floras – it's almost incomprehensible! But *D. glabra* really *is* basically the same thing as *D. aemula,* from the same blackish-purple stipe (on mature fronds), with shaggy, concolorous, red-brown scales at its base, to the thin covering of lanate (woolly) scale-debris over the stipe and rhachis in larger plants, the pale-yellow-green, when exposed, or darker-green, when shaded, slightly-crispy, crimped-up lamina, the same segment-shape and the same small sori with smaller indusia, the same obvious mealy covering of blunt-headed glands scattered over the axes and lamina, particularly in young fronds, and even the same precociously fertile baby plants. Highly significantly at least the majority of plants even have the give-away scent of recently-dried hay, just detectable in living plants on occasions, but clearly smellable in the newly-dried pressed specimens – said to be due to the presence of a chemical known as 'coumarin', though I don't know if that relates to modern phytochemical studies. Anyhow it's more or less my same most favourite fern – I'd know it anywhere! Some of the larger specimens have more dissect fronds than our *D. aemula,* with rather less-crowded and more acute segments, so there is just a slightly different range of variation, which one should expect right over here – and especially as the Hawai'ian flora (including the flowering plants) is renowned for its exceptional and baffling ranges of variation within species. But comparing these plants with the highly-dissect Madeiran population, or with certain rather similar north-Spanish populations, one can hardly see much distinction, and a number of specimens match almost exactly some of our British plants. I am quite clear in my mind that this *D. glabra* is what is called a vicariant (or geographically separated equivalent) of our *D. aemula* because of its very closely similar morphology and, I presume, relationship. To investigate this, Prof. Widén of Helsinki will soon compare the two chemically from dried rhizomes I collect.

But how on earth can *D. aemula (sens. lat.)* have got here, or be here, in the middle of the Pacific on the other side of the world and nowhere in between? I do not much believe in random, and especially world-wide, long-distance spore-dispersal for any but, perhaps a handful of tropical adventives, "weedy" *Nephrolepis,* thelypteroids and what have we; and from the distribution patterns I know it just clearly hasn't happened in *Dryopteris* as far as modern-day ranges indicate. Even in the remarkable case of the Central-American *D. patula,* which I recently discovered to be in West Africa, to my surprise, I am now more inclined, as Prof. Pichi Sermolli has suggested to me, to look to tectonic-plate movement ("continental drift") separating Africa and America, than to recent long-distance spore-dispersal, though a study of this discovery is now being prepared (by Fraser-Jenkins, Pichi Sermolii & Viane). Of course long-distance dispersal must have been involved at some stage in the past history of every single living organism on Hawai'i as the islands are oceanic and arose volcanically out of the sea – but the jumps were from nearby continents and islands, not from right around the world, and most of them appear to have happened a long time ago in the past (i.e. as infrequent events). A recent wind-blown jump from Europe around the world just to Hawai'i? I don't believe it. Anyway the Hawai'ian plant is just that little bit different from the European. So let's look at the adjacent land-masses across the ocean from Hawai'i. To the distant south-west and south-east into the southern hemisphere one is looking into an area where *Dryopteris* generally doesn't occur except for a few invaders from the north (this is excluding only Africa, which contains no species related to *D. aemula* or its Section). To the north there's almost nothing except for two unrelated Siberian to North American, circumboreal or circumpolar species, *D. expansa* and *D. fragrans,* so that area is irrelevant unless one postulates a north-pole situated in central-Asia or -Europe during tertiary times and a migration route around the north Siberian coast, for which there is no evidence at all and which would be preposterously out-of-keeping with all other fern distribution patterns – a far-fetched idea! To the east is the rather *Dryopteris*-poor area of North America with no *D. aemula* relatives (mind you, a close relative of the Mediterranean and Asian *D. pallida* is there on the west coast, *D. arguta,* again hard to explain), or alternatively there's Mexico and Central-America with no close relatives again except for the quite distinct *D. nubigena (D. futura* is another, distinct but closely similar species) which I believe is in the same Section (not in subgenus *Nephrocystis* as I thought in my classification paper when I did not know that species so well), but it is too distantly related to *D. aemula* to be relevant. To the west are the south-east-Asian flora and the eastern fringe of the Sino-Himalayan fern flora, both with no species in Section *Aemulae,* and there's also the Japanese *Dryopteris* group. Here at last, there's a sort of connection, though not as close as one needs to explain the situation, which comes in the form of a species called *D. gymnophylla* (and also the somewhat more distant *D. chinensis,* again in Section *Aemulae,* of Japan, E. China and the southern parts of east Siberia). *D. gymnophylla* is a species close to *D. aemula* – actually I wish I could go and see it on my way back from Hawai'i, but I'm sure my tickets cannot now be altered reasonably cheaply! But, though close, they are not the same and may only indicate some split off in the distant past. The connection is probably significant though, and elsewhere in the world there is just one *possible* hint of what might have happened, long, long ago in the early or mid tertiary period, and that is the presence of *D. aemula* in north-east Turkey (see Fraser-Jenkins in the *Bulletin* 1975) in a strongly oceanic or "Atlantic" area influenced by the Black Sea. This suggests that *D. aemula* may once have been right across Europe before the drying up of the Mediterranean regions; and there is even a nineteenth century record of it which I found in Basel herbarium, where it was unidentified, from near Seravezza in the Alpi Apuane in a small, highly Atlantic area of north-western Italy, where *Trichomanes* and *Hymenophyllum* have been rather recently discovered and where it may yet turn up if the label on the specimen is really genuine, which I'm inclined to think it is. So could it once have been

right across Asia too, long before the present Sino-Himalayan fern flora occupied and evolved in the newly arising Himalayan ranges? Could it perhaps have spread all along the erstwhile temperate and oceanic shores of what is now Central Asia, along the coast of the Tethys Sea when India was a separate island and before the mightly Himalaya, carrying the Tibetan plateau up with it, arose to obliterate the Tibetan-Mongolian flora in desolate rain shadow locked in the bitter cold grip of its ever increasing altitude? To me this seems the only plausible explanation even if it does strain belief - indeed I think one should really be looking from Asia westwards towards the European and Atlantic populations, which probably represent the ultimate extreme of migration of the species from an ancient centre of distribution in China, as appears to be the case with a great majority of *Dryopteris* species, rather than the other way around, which, as Europeans, we think of at first. *D. aemula* is probably our most direct link with tertiary period China. It's our own pre-Ming *Dryopteris!* There are other such examples - the connection between *D. oreades* and *D. sichotensis,* or between *D. pallida* and *D. nigropaleacea,* or between *D. affinis* and *D. wallichiana.* But all of these are possibly more modern or at least more obvious as the relevant vicariant species still survive in the orient, and in this case only *D. gymnophylla* really shows any reasonably close connection to *D. aemula.* But like *D. wallichiana,* it seems the ancient *D. aemula* reached Hawai'i from Asia - unlike it, it must all have been obliterated in eastern Asia, due no doubt to its great tenderness in terms of being markedly oceanic - only the two extremes of migration are left, in the Atlantic region and in the central Pacific, plus that exciting little remnant in Turkey. The cold coast of temperate eastern Asia must have been too much for it. If so this is an even more spectacular disjunction of range, due to extinction, than the well-known case of *Adiantum reniforme* in Macaronesia with its close relatives across the other side of Africa in Réunion and Madagascar, and in Szechuan in west China. But I wonder if anyone else can come up with any alternatives or pertinent observations? I'm offering a plant each of two superb Hawai'ian *Polystichum* species and of the magnificent *Sadleria cyatheoides* (see below) for the best (shortish) suggestion or comment anyone can send me (serious or not) on this extraordinary situation - the editor of the *Pteridologist* will also try to include it in a forthcoming issue - so thinking-caps on!

It is relevant here to comment on the antiquity of some of the species in Hawai'i. From its unspecialised morphology it certainly seems that the *D. aemula* group along with all its Section is perhaps the most ancient group in the subgenus *Dryopteris* (other, possibly equal, contenders being the *D. wallichiana/D. hirtipes* Sections and the *D. patula* Section). This was first postulated by Prof. G. Vida some twenty years ago and I remember being impressed with his idea, based on the morphology being intermediate between *D. pallida* and *D. dilatata,* when I first visited him and we sat on his terrace overlooking Budapest discussing it in 1969. Since then, knowing the wider ranges of the genus, I can see that Section *Aemulae* also shows some morphological similarities to subgenus *Nephrocystis* Sect. *Purpurascentes* (e.g. *D. purpurascens* and *D. pulvinulifera)* as well as to subgenus *Dryopteris* Sects. *Pallidae, Splendentes, Marginatae* and *Lophodium,* while subgenus *Nephrocystis* is itself slightly towards some of the compound Polystichoid ferns such as *Arachniodes,* which appear to be ancient in the family *Dryopteridaceae.* But in numerous other genera Hawai'i is full of very ancient isolated endemic species and even has genera unlike those anywhere else, that are presumed to have become extinct on the mainland a long time ago. In case anyone is wondering how it can be that such young islands (Hawai'i, Big Island, is less than a million years old, and still erupting), which recently emerged from the sea, can contain very ancient endemic species - there is really no problem. Apparently there is a volcanic "hot-spot" in the earth's crust below the bed of the ocean, which has stayed still, where it is, while the tectonic plate above floated, and still floats, slowly towards the north-west; each time a weak

area in the plate crosses the "hot-spot" eruptions build up a new island – there is even a new one forming under the sea east of the Big Island today. But as the islands age, by then carried beyond the "hot-spot", they weather rather rapidly and are eroded away as they continue, so as one looks to the north-west the islands generally get lower and smaller until they disappear and leave only a line of tiny fragments and atolls above larger under-sea plateaux where they once were. These are of course much older – so going north-westwards, Kaua'i is about 5 million years old and Midway Island (about 1200 miles from Big Island) is about 28 million years old – and the line of submarine stumps extends virtually to the Asian mainland near Kamschatka, where the Pacific plate dips down into a deep trench. Once plants had blown to the islands, a long time ago, they could hop from island to island as each new one appeared, before they were extinguished by the previous island's disappearance. In the meantime the original mainland populations became extinct. As examples of these very ancient remnant species, in *Dryopteris* there is a superb, seven foot, up to five-times pinnate, impressively scaly species called *D. acutidens* C.Chr., whose massive fronds engulfed me (and with excitement too!) a couple of days ago in the dense forest on the north side of Haleakala volcano, where I was shown it by Dr Bob Hobdy of the Forestry Division, here on Maui. It has no close relatives, unless perhaps it is remotely connected to Section *Aemulae,* but as such a very distinctive member of it that I cannot be at all sure. It is interesting too for its large range of variation, from coarse fronded plants (perhaps taxonomically recognisable) to ones with superb finely-cut ultimate segments. There is also a tiny species on Kaua'i, *D. parvula* Robinson, with sori at the distal margins of the segments and the fronds no more than about six inches long (see Wagner in *Fiddlehead Forum* 1988); this *is* in Section *Aemulae,* though again very distinct, and I had previously thought it was in subgenus *Nephrocystis* in my classification. Another odd one, too, the delicate little *D. crinalis,* hanging off cliffs in the "fairy moss-forest" looks close to *Ctenitis* at first, but I feel pretty sure it must be a rather isolated member of the Japanese subgenus *Erythrovariae* as it has wide-based scales under the costae and a segment-shape like *D. championii* or *D. varia* in that group. Curiously a number of Hawai'ian *Dryopteris* species are exindusiate (never have an indusium), including *D. acutidens, D. crinalis, D. unidentata* and the huge, deltate-fronded *D. sandwicensis* (synomyn: *D. maniensis* C.Chr; this latter species being an endemic member of Section *Marginatae),* which makes for difficulty at first in recognising them as *Dryopteris* species, though this phenomenon also occurs in a few other *Dryopteris* species in various parts of the world. I am very pleased that Prof. Wagner, of Ann Arbor, and I are going to pool our efforts to study these complicated *Dryopteris* species.

Of course I cannot go around Hawai'i seeing only *Dryopteris* – there is a multitude of superb species here from tall, stiff, narrow-fronded *Polypodium pellucidum* var. *vulcanicum,* among rocks and grass in the high-altitude lava fields, to superb epiphytic miniatures like the feathery *Adenophorus tamariscinus* and large but delicate filmy ferns such as the hairy-stemmed *Callistopteris baldwinii.* But before I stop I must mention the three superb Hawai'ian *Polystichum* species and the magnificient *Sadleria* – all four endemics. The *Polystichums* are *P. haleakalense,* with narrow fronds covered in long teeth and white scales, growing at high altitudes in the grassland gulleys, *P. bonseyi,* Prof. Wagner's new species, a bit similar to *P. braunii,* and the magnificent, stiff-fronded, glossy dark-green *P. hillebrandii,* whose stipe and rhachis are densely covered in large, rounded, reddish scales. But the king of all is *Sadleria cyatheoides* the commonest of several species in an endemic genus related to *Blechnum.* It reaches high altitudes as a smaller plant, but grows at its best at about 7000 ft in sheltered gulleys where it gets to be ten feet or more tall with vast, immensely stiff, bipinnate fronds arising from a shaggy, tree-fern like trunk up to three feet high. The lamina is thick, deep-green and glossy above and is markedly glaucous-white below, with linear sori running

up the middle of each pinnule. As if this were not spectacular enough the young fronds are bright pink with superb brick-red stipes. It is a truly smashing fern and grows everywhere, even in the frost zone – I hope it will be hardy in damp areas of Britain. There are also three other smaller endemic *Sadleria* species.

Anyhow there are heaps of other ferns I could mention but I now have a bath full of ferns still to press (useful things, baths!) and several more excursions to make. Tomorrow I shall be busy!

The spores of a fern from Hawai'i
Must have blown round the world in the sky'i,
When they flew over Spain
They dropped in the rain,
And that *isn't* the reason why'i!

I am immensely grateful to Professor Reichstein of Basel for most kindly providing the major part of the finances I needed for this exciting trip.

UNUSUAL FERN BEHAVIOUR

J W Dyce
46 Sedley Rise, Loughton, Essex IG10 1LT

Ferns can be very strange in their behaviour at times, doing the most surprising and unusual things, quite outside their normal character and quite mystifying to the grower. Some of their aberrations are, of course, the variations which we treasure as very acceptable garden plants, but I am concerned here with other kinds of behaviour which are not very common, either in the normal species or in varieties.

Division, much of it multiple, at both frond and pinna tips, and occasionally even at pinnule tips, is common in many of our ferns and we accept this, although at times we wonder why ferns do it. The answer lies in some gene abnormality in the plant chromosomes. Many of the more *unusual* changes must be the result of similar mutations; others result from other causes. Still on the subject of cresting, the name given to this kind of frond division, why should some ferns, chiefly hart's-tongues *(Asplenium scolopendrium),* develop magnificient crests one year and be completely devoid of them in other years, particularly if they have been moved into gardens from the wild? How often have we brought home a most magnificently crested "scollie" from the wild, only to find it turns out to be completely normal the next year and all following years! Is it something to do with soil or weather conditions which stimulates or inhibits such development?

Then there is the kind of behaviour occurring in some of our best varieties, an instability in their varietal development which causes part or the whole of a frond, or even the whole plant, to revert to the normal species form, either temporarily or permanently. Such plants must have a very unstable complement of genes, particularly in the case of highly developed kinds of variation reverting permanently to the species normal form, as in the case of *Polystichum setiferum* 'Pulcherrimum'.

Only 16 plants of this variety were ever found in the wild, over a limited period around the 1880s, all from the same part of the country, the south-west of England, and 9 of them by the same hunter, J Moly. They were fertile and several similar varieties were produced in cultivation. They were most remarkable ferns – the lower pinnules on the pinnae, and sometimes the upper ones, were falcate, curled and very elongated, deeply and finely divided along their lengths to resemble small feathers; the tips on most of these were extended into long slender threads, often bearing prothalli at their ends (apical apospory). But one and all of them were completely unstable and very,

very rarely did any of them ever display the varietal form throughout the whole plant – a frond sometimes or, more often, part of a frond, or parts of one or a few pinnae was all they would condescend to show. Those bred in cultivation behaved in the same way, and in the course of some years all of them, except one, had reverted permanently to normal *P. setiferum,* and no others have ever been found. The exception, named 'Moly's Green Pulcherrimum', is still grown today by a few of us, but very rarely does it deign to show its real character although its normal fronds have a subtle difference in their looks which proclaims its identity to the informed grower.

Another reverting variety is *Polypodium australe* 'Cornubiense', along with its progeny; an inherent instability appears in all of them. Its effect is to produce the occasional frond of normal polypody shape with the pinnae narrow and entire instead of being very wide and deeply divided. The appearance of these normal fronds makes a good identification character to distinguish this variety from the very similar 'Pulcherrimum', both of them fertile, and from the sterile 'Cambricum' which also looks very similar. (Note – don't get confused between *Pulcherrimum* in this species and the similarly named varieties in *Polystichum setiferum,* referred to in the previous paragraph).

There is still another first-rate fern variety marred by instability – *Athyrium filix-femina* 'Frizelliae'. The original plant, found in Ireland over 100 years ago, has passed on the fault to its numerous progency – an unfortunate propensity for the occasional tightly curled up pinna to burst out into normal growth, spoiling the symmetry of the very narrow fronds which look like rows of tiny curled green shells or beads up each side of the main rhachides.

A type of variation which occurs in some ferns, chiefly *Polystichum sertiferum* and *Asplenium scolopendrium,* is *brachiatum* where, in the former species, the basal pinnae develop excessively and become, in the best examples, completely separate fronds. In the latter, the basal *lobes* develop in a similar way. The general effect is to give the fronds a deltoid appearance. Whilst this in itself is unusual behaviour in ferns, it is an accepted form of variation which adds much to our fern riches. But, an irregular form of this variation, which is *not* acceptable, can be, at times, induced by external causes, such as drought.

During the 1970s we had two successive exceedingly dry summers when constant watering was necessary to keep ferns alive. My ground became so dried out that, for some years afterwards, in some places I could dig up, literally, dust from more than a spit down. Being on sloping ground, the rain of the following years drained off down the hill before it could penetrate the dusty subsoil. In the year following the two dry ones I noticed some of my ferns behaving a bit strangely, but not exceptionally so, apart from one plant, *Polystichum setiferum* 'Plumosum Green'. Never before or since has this fern ever shown any sign of abnormality or any change from its varietal form, but this year it produced on some of its fronds, not from the base but randomly throughout their length, the odd pinna growing out to two or three times the normal length to become, in effect, separate small fronds. This has been my only experience of this kind of behaviour, but the old literature depicts many such plants as named varieties. It appears also in the Jones Nature Prints, the history of which appears in this issue, but such development cannot be regarded seriously as acceptable variation, all of it, no doubt, as evanescent as it was with me, induced by some temporary stimulus outside the plants themselves.

We regard *Dryopteris dilatata* as a species of individual plants with erect rootstocks and tall fronds in shuttlecock formation, but it can adapt in an unusual and interesting way when it is growing in woodland or in other places where there is a shallow layer of humus over a compacted subsoil which its roots cannot penetrate. In such conditions it can appear as a colony of quite dwarf plants extending at times to some yards across.

Dig up carefully a crown and it will be seen to be connected to other crowns by means of thin copper-coloured underground rhizomes or runners – rather like the way strawberry plants spread, except that the strawberry runners are not growing beneath the surface of the soil. This development is obviously a survival precaution on the part of the fern growing in difficult conditions.

Back in the pre-war years before I knew very much about ferns I made a find which at the time did not impress me as it should have done. In a deep, narrow and wet ravine running up the slopes of a Scottish mountain I found a very unusual plant of *Asplenium viride*. It was growing in a small recess among the wet sphagnum moss which draped the vertical rock face. It consisted of two crowns dangling from the "roof" of the recess at the end of a 12 inch long green stem about a sixteenth-inch in thickness. About half-way down, the stem divided into two and a rosette of green fronds was suspended from the end of each. In the lush humid conditions of this protected habitat the plant's growth must have been greatly speeded up but, even so, how many years would be needed to develop a stem that length? It was obviously not an extended root since the growth continued for a further 6 inches after the two crowns became separated. I have visited the ravine again more than once in the post-war years hoping to repeat this find but with no success. With increased knowledge of ferns I very much regretted, and still regret, that I did not preserve the plant in my herbarium. Without the material evidence it is asking a lot from my botanist friends to give me a satisfactory answer to this phenomenon. It would be most interesting to hear if similar finds, in this or any other fern species, have ever been made.

Bulbil formation on the fronds of some fern species is quite normal, particularly on some of the foreign species we grow, such as *Asplenium bulbiferum* and *Cystopteris bulbifera*. In the British ferns it is fairly common only in some of the more developed varieties of *Polystichum setiferum* which, in a good growing year, can have their fronds literally covered, along the rhachides and even the secondary ones, with a dense growth of tiny plantlets. More unusually, they can occur on some varieties of *Athyrium filix-femina*, and they can even be found, but rarely, on the upper frond surfaces of some *Asplenium scolopendrium* plants. Another unusual place is on the very long and thin stipes of *Osmunda regalis* sporelings, with the addition of long fine hair roots extending down to the soil below.

I include *Depauperatum* in this article, although it can by no means be regarded as unusual – very much the reverse. It is, very obviously, a gene abnormality. In the worst cases the plants seem to go berserk – the fronds are malformed, pinnae are missing or truncate, or otherwise deformed, and pinnules are missing, appear as fine spines, or are contorted into strange and ragged shapes. Such plants often appear in the wild, and in cultivation in spore sowings. But there are *some* depauperate plants which have not gone berserk – the irregularities are controlled and in many cases are so regular in their pattern that they become quite acceptable variations. I grow such a variety, a wild find of a lady fern made very many years ago, with very simple but regular and acceptable deficiencies. The top basal pinnule on every pinna is missing and replaced by a fine spine and the top basal lobe on every pinnule is similarly missing and replaced by a minute spine. The whole plant is completely regular in this way and presents a very beautiful and open lacey appearance. It has only once presented me with two self-sown sporelings; although the parent has no trace of cresting in its make-up, one of the sporelings was cristate and the other percristate. Both are very acceptable bonuses and, like the parent, are very strong-growing and continue to flourish in my garden.

Finally, we have to consider damage variation. This is induced by many causes which, as the name implies are the result of damage of one kind or another to fern plants. A common cause is the plant being dislodged from the ground and hanging on by only a few of its roots. Plants can be trampled on by human or animal feet, run over by

vehicle wheels and, in country lanes, slashed by hedge trimmers. Crowns can be damaged by frost or partially rotted by excessive moisture. The result is that, in striving to continue alive, the plants throw up the odd new frond and where fronds have been slashed, secondary ones, but seem to have become so disorganised that their efforts can produce many unusual frond shapes, some really bizarre and very deformed. Some can even present the appearance of first-class varieties! Beware of these – they are a trap for the unwary hunter who carries the plant home, exculting in his prize, only to find that later fronds and the following year's ones come up in the normal species shape!

THE JONES NATURE PRINTS

J W DYCE
46 Sedley Rise, Loughton, Essex IG10 1LT

Most of our members who take an active interest in the working of our Society and in its literature will have come across references to the *Jones Nature Prints,* but know little or nothing about what they are. They are not alone in this lack of knowledge about this remarkable collection of nature-printed impressions of fern fronds. Several mysteries surround them, and had it not been for the writings of two men at the turn of the century, E J Lowe in 1895 and W H Phillips in 1905, all of us would have been equally ignorant. It was almost as if there was a conspiracy of silence about them, all the more surprising since many people were involved in the task of making them. Although there were only 48 subscribers willing to purchase them they must have been very well known among fern-men at the time of their publication over a period of five years from 1876 to 1880. Several years ago, J A Crabbe of the British Museum (Natural History) and I devoted much time in an effort to solve the mystery, particularly concerning the methods used to produce them, but found not a scrap of information anywhere which could help us.

My main source of information for this article is the then President of our Society, W H Phillips, who in 1905 gave his presidential address to the Society at the Annual Meeting in the Lake District in the north of England. His subject was his personal reminiscences of his life among ferns and it was published later in the Society's Annual Report. By great good fortune he included the story of his involvement in the making of the *Nature Prints,* and the following sentence stands out – "The history (of the Prints) is perhaps not known to many of our members, and it may be read with interest by our successors". A far-seeing man was friend Phillips!

In the early 1870s Phillips was invited to join the West of England Pteridological Society which had just been formed. Living in Ireland, too far away to attend its meetings, he elected not to join – a decision he regretted later. Col A M Jones was a founder member of this Society and possibly had something to do with the decision to publish a series of nature-printed fern fronds, entitled *Nature-printed Impressions of the Varieties of the British Species of Ferns,* (an impressive mouthful!), to its members at a small cost. Before the first of this series was issued the society ceased to exist. After only a very few years in existence it seems to have disappeared without trace. There is a complete lack of any information concerning its founding and demise. All the literature we have is a leaflet listing its officials and the prominent fern-men of the time who belonged to it. Also, all the information we have about its nature-print issue is that a set was in the possession of Dr Allchin, one of the well-known fern-men of the time, who showed this, beautifully coloured, to Phillips some time later. It was the sight of this which led to Phillips' regrets.

What happened to those prints? There is a mystery here. Although, according to Lowe, they were not issued, we must assume that some were printed since Dr Allchin had a set. There is confusion because the report of Lowe in his *Fern Growing,* published

in 1895 by Nimmo, London, page 173, and Phillips' version to our Society in 1905, do not agree. If we understand Lowe correctly, the original project was the brain-child of the Rev Charles Padley, begun some time before 1876 when Col Jones, on the collapse of the society, took over the work from Padley and completed the task in 1880. Padley is said to have had an exceptional mastery of nature-printing and he entrusted the work of printing to Thomas Smith and "had caused him to be instructed in the best system of Nature Printing then in vogue". Smith developed processes never before employed in this kind of work and to which much of the excellence of the Prints were credited. (We have endeavoured - in vain - to find out anything about those processes). It was when Padley abandoned the project that Jones took it over after securing the services of Thomas Smith. Later, through pressure of business, Smith had to resign from the work which was then continued by Jones himself, assisted by his sister and daughters.

According to Phillips it would appear that the *Nature Prints* we possess today had nothing to do with the prints produced by the defunct society, but were produced entirely by the efforts of Col Jones who was possibly stimulated into action after the original publication collapsed. In 1875 he invited Phillips and many other fern-men to subscribe for a series of fern prints he planned to produce. Altogether, 48 subscribers met the cost of the production. There were many teething difficulties, among them the kind of paper to be used and the method of reproduction. The task of printing was entrusted to Thomas Smith. No mention is made by Phillips of the later difficulties when Smith resigned and the Colonel, assisted by his family, completed the work themselves in 1880.

Since Phillips, according to his report, was involved in the Jones' project from its beginning, his version is convincing, but we have to assume that Lowe, from what he says, was a member of the defunct society and must have known all that was going on. Of course, both men were writing many years after the events and, with advancing years - 20 years later, their recollection of the facts would probably have got somewhat dimmed, leading to their differing accounts. We are left with this uncertainity. But, if we try to "marry" the two stories, it could be assumed that the original prints of the earlier society were not lost - possibly one series or part of a series had been completed before the society collapsed, and Jones took this over after Padley backed out, and continued the project to its end in 1880.

The first series of the Prints which were of full-sized fronds on folio paper, was published in May 1876, the second in March 1877, the third in December 1877, the fourth in December 1878, the fifth in December 1879 and the sixth in October 1880.

In all there were 323 sheets - (up-to-date names are added within brackets)

3	*Asplenium adiantum-nigrum*
1	*Asplenium lanceolatum (A. billotii)*
9	*Asplenium marinum*
7	*Asplenium trichomanes*
5	*Adiantum capillus-veneris*
50	*Athyrium filix-femina*
18	*Blechnum spicant*
3	*Cystopteris fragilis*
1	*Lastrea alpina (Dryopteris expansa)*
13	*Lastrea filix-mas (D. filix-mas)*
12	*Lastrea pseudomas (D.affinis)*
1	*Lastrea propinqua (D. oreades)*
12	*Lastrea montana (Oreopteris limbosperma)*
8	*Lastrea dilatata (D. dilatata)*
1	*Osmunda regalis*

22 *Polypodium vulgare*
1 *Polypodium phegopteris (Phegopteris connectilis)*
7 *Pteris aquilina (Pteridium aquilinum)*
4 *Polystichum aculeatum*
97 *Polystichum angulare (Polystichum setiferum)*
48 *Scolopendrium vulgare (Asplenium scolopendrium)*

Several sets of the Prints are scattered around the country, in museums, university libraries, Kew Herbarium and others; some are still in private hands. Along with each series information sheets were published, listing the names of all the varieties depicted. Although it would have made much more work it would have been more satisfactory to have had each sheet labelled with its fern name, since some sets have become separated from their information sheets, making identification in many cases very difficult. I am the proud possessor of the set which belonged to Dr F W Stansfield; it came to me through his son-in-law, Percy Greenfield, my old mentor in all fern matters. This set was properly labelled by its first owner.

A large number of spare sheets of the *Nature Prints,* numbering hundreds, were gifted to our Society soon after the end of the Second World War by Miss Jones, a daughter of Col Jones. They are lodged in the British Museum (Natural History). Several years ago we endeavoured to build them up into sets but discovered that none of the ferns depicted in them agreed with the published set. Many looked very similar to the named ones but in the absence of labels we could not give them definite names. I think they must be trial or experimental sheets used by the Jones family when learning how to nature-print. Many of the sheets are a series of about a dozen of the same frond and it is interesting to note that with each copy some of the pinnae moved progressively further away from the first position.

It is a strange fact that many of those fern men, if not all, living 100 years ago, seemed to be lacking in aesthetic taste where ferns were concerned and one notes this very clearly in the *Jones Nature Prints.* The majority of those depicted are of beautiful shapely varieties, completely regular in all their parts, but quite a number are literally depauperate rubbish. It is most surprising that time and paper were wasted in reproducing them. Of course, in those days, "name" collecting was common - the object seems to have been to boost numbers in collections by naming every single variety found or bred, good or bad, which differed in any way from each other. But I would not have thought that Col Jones was in that category - unless he left the selection of the fronds to be depicted in the Prints to others who had lower standards of perfection. We associate the Colonel, in collaboration with Dr E F Fox, with the sensational break-through in *Polystichum setiferum* - the *plumoso-divisilobums,* beautiful forms of perfect and elaborate symmetry.

C T Druery included in his *British Ferns and their Varieties* an Appendix depicting in colour 96 of the *Nature Prints.* For a long time our Society has been considering the possibilty of publishing the Prints in a bound volume. Whether or not we shall ever be affluent enough to do so is another matter! Perhaps we should do as Col Jones did and invite subscriptions for its publication!

Finally, I am much indebted to our Editor for his valuable help in writing this article. His researches have added greatly to what I originally planned to write and to its interest.

THREE SUBSPECIES OF BRACKEN IN BRITAIN

C. N. PAGE & Y.C. GOLDING
Royal Botanic Garden, Edinburgh EH3 5LR

Recent research at the Royal Botanic Garden, Edinburgh into the variation of Bracken in Britain has recently made some striking taxonomic advances. For it has become clear that there is not just one kind of Bracken in Britain, but at least three. These different Brackens are now recognised as distinctive subspecies.

The two new Brackens, Northern Bracken *(Pteridium aquilinum* (L.) Kuhn subsp. *latiusculum* (Und.) Desv.) and White-haired Bracken *(Pteridium aquilinum* (L.) Kuhn subsp. *atlanticum* C.N. Page), can be easily recognised apart from common Bracken *(Pteridium aquilinum* (L.) Kuhn. subsp. *aquilinum)* by a number of detailed features of frond morphology, but can most easily be first spotted in the field when their fronds are expanding throughout the spring and early summer. A synoptic outline of their differences, including those of the crozier stages, is thus given below. A fuller description of the two additional subspecies is currently in-press (Page, 1989).

Northern Bracken is especially distinctive in spring or early summer by having fronds:

1. which complete their expansion rapidly and very much earlier than Common Bracken (usually at least 2-4 weeks earlier)
2. in which all the pinnae unroll nearly simultaneously (unlike the sequenced unrolling of successive pinna-pairs of Common Bracken)
3. which have their croziers covered in a fairly dense mass of predominantly cinnamon-coloured hairs when unrolling, the expanding frond and pinna-tips thus appearing of an overall notably bronzed colour, making them distinctive and recognisable, even at a distance, from the merely tawny croziers of Common Bracken (which contain a blended mix of about equally abundant red and white hairs).

   Additionally, the fully expanded fronds are relatively small and usually lower-growing than those of Common Bracken in the same environment. They have much thinner, more wiry stipes, and more leathery blades held stiffly at an angle to the stipe and form an especially broad-based triangle in outline. Most of the hairs are rapidly lost following frond expansion from all surfaces, leaving a shining and glabrous upper leaf surface and stipe.

White-Haired Bracken is also at its most distinctive in spring or early summer by having fronds:

1. which complete their expansion slowly and very much later than Common Bracken (by at least several weeks, and, in cool sites, most fronds may still be unfurling at their tips in late summer!)
2. in which there is a very highly sequenced succession of pinna expansion progressively up the frond (even more so than in Common Bracken).
3. which have their croziers covered in a dense mass of long, white, silky-textured hairs only, making them distinctive and recognisable even at a distance from the mixed red and white haired croziers of Common Bracken

   Additionally, the fully expanded fronds are relatively large and often taller-growing than those of Common Bracken in the same environment. They have very much thicker and more succulent stipes, and soft-textured blades with dropping pinna-tips, the whole frond being strongly upright and of ovate outline, with each pinna-pair separately rotated into a horizontal plane from the nearly vertical rachis. Short, white hairs are usually long-persistent, during the life of the frond, over the surfaces

of the blade and down the stipe, which can usually be seen to advantage when a specimen is held towards the light. These give the blade a softly pubescent texture to the touch.

Both these two new Brackens appear to be less vigorous and less aggressive than Common Bracken. Each is most likely to occur either as isolated, small stands or as small patches within areas of much more extensive Common Bracken.

Northern Bracken, as its name suggests, is likely to be mostly northerly in its range in Britain and possibly Ireland, although exact knowledge of its total distribution is as yet scanty and it could well have local enclaves even in the south. By contrast, White-haired Bracken is likely to be more southern and western in its overall pattern of distribution, but like Northern Bracken, there is, so far, little exact detail of its overall range.

Herbarium information about Bracken helps only a little in a critical search for further localities. For Bracken, as a whole, must be the world's most under-represented fern, and most herbarium Bracken specimens consist of fragments of mature fronds usually lacking evidence of both the overall growth habit and the early-season frond expansion phases, which are the most helpful stages in the ready separation of the subspecies.

Records of suspected material of either of these Brackens can best be authenticated by pressing a few fronds, or by taking close-up colour photographs of them, especially when at the crozier stage. Information of the occurrence of possible finds of either would be welcomed by the authors at the Royal Botanic Garden, Edinburgh, and will help to compile a more exact picture of the range of these two unusual native ferns.

Reference:

Page, C.N. 1989. Two additional subspecies of Bracken, *Pteridium aquilinum* (L.) Kuhn., in Britain. *Watsonia* (in press).

BOOK REVIEW

FERNS OF NEW ZEALAND By Susan, Martyn and Elizabeth Firth with photographs by Robin Morrison, 80 pp. 1986. Hodder & Stoughton, Auckland. ISBN 0 340 401 214 (limp). Price £14.95.

This beautifully illustrated book was written by three bush-lovers who have grown all the 59 species portrayed and who can therefore give hints, as they do, about cultivation based on experience. Obviously not all New Zealand species are discussed; they are particularly thin on Hymenophyllaceae - species not easy to grow. They have chosen to team up with a professional photographer who has taken some very beautiful portraits of the ferns in question. In some, the blues appear enhanced, but those who photograph plants in deep shade will appreciate the need for fast film and also know that the blue end of the spectrum is dominant in wet shady forests. Some pictures make one want to take the next flight to New Zealand, e.g. the banks of *Leptopteris superba* (but it would have been nice to contrast it with *L. hymenophylloides!).* Some are very explicit, e.g. *Loxoma cunninghamii;* other like *Lygodium articulatum* are difficult to interpret if one does not know the growth form and habit of this climbing fern.

But on the whole this is a book that one would be pleased to own. It makes an ideal present.

CLIVE JERMY

BRACKEN

STELLA MARIS TURK
Shang-ri-la, Reskadinnick, Near Camborne, Cornwall, TR14 0BH

Many years ago, before so much was known about the many poisonous properties in plants, and the hidden dangers in animal food, I was heard to say that it is safest to treat all food as potential poison. Even the 'safest' substance may cause anything from a mild allergy to a severe illness in some people. It is also many years ago, when working on a Cornish farm, that I followed the recommended practice of placing bracken on the heads of horses to ward off flies, and I have seen bracken placed on fish slabs in Cornwall for the same purpose. The bliss of ignorance is replaced by the painful awareness that many unsuspected plants have deadly devices to protect themselves. Bracken is such a plant, and considering that it is the commonest fern in Britain, covering more than one and a half million acres - and increasing - there is some cause for concern. Indeed, an International Bracken Group has been formed to monitor its spread and study methods for its control. This handsome fern can grow to two metres high and is a conspicuous feature of the Cornish landscape, flourishing on the light acid soil of cliffs and heaths as well as woodland glades: it becomes scarce in denser wood cover and indeed it is deforestation which has encouraged its growth. It is significant that very few native insects feed on it, and now two species of South African caterpillars are being tested in quarantine rooms of Imperial College, London. One of these is "incredibly voracious" and shows interest only in bracken, so hopefully it will help to control this fern without causing any of the problems that have been associated with other such introductions.

According to *Poisonous plants in Britain and their effects on animals and man,* a comprehensive book produced by MAFF in 1984, every part of the bracken plant "contains toxic constituents, at least some of which remain after cutting and drying". Because several different poisons are present, and their concentration is somewhat variable, their effects cannot always be anticipated. Cattle, horses, deer and sheep are especially at risk in drought conditions, and many cases of poisoning were attributed to bracken in 1976. Two cancer-inducing substances are known to be present, and grazing animals frequently develop tumours after feeding on bracken. Animals and humans alike can develop a taste for this dangerous plant, and it is eaten by people, especially in Japan, America and Canada. The uncurled fronds - aptly known as "fiddleheads" in America - are favoured, and these contain high concentrations of carcinogenic agents. In Japan this food has now been associated with oesophageal and stomach tumours. Recent research shows that even the spores can be dangerous and as these can be inhaled or ingested, it is important that control cutting should be undertaken before the spores start to ripen in June: it is said that cutting twice a year can reduce growth by 95% in three years.

Quite apart from danger to animals and humans, the invasive nature of bracken destroys the diversity of many habitats, so conservationists may well feel justified in controlling its spread. Chemical control has been found to be moderately effective, but probably regular cutting in early summer, before the spores are mature, is the safest and most effective method.

Life is full of hazards, even for civilised humans living in idyllic conditions in the Cornish countryside. Why should we expect it to be otherwise?

(This note first appeared in *The West Briton)*

LYCOPODIACEAE IN NORTH EAST HAMPSHIRE

CHRIS HALL
Countryside Action, 30 Florence Road, Fleet, Hampshire GU13 9LQ

Introduction

Since 1800 there has been an enormous loss of lowland heath in North East Hampshire: some 88% has been lost and a quarter of that remaining is in an impoverished condition (Hall, 1988). This represents a rate of loss which is substantially greater than the national average. It may be inferred that species which are dependent upon heathland habitat will also have declined severely. There is a strong body of circumstantial evidence to suggest that losses of wet heath and bogs has been still greater.

One group of plants reliant on lowland heath in the South East is the clubmosses. Three species have been recorded from the heaths of Hart District and Rushmoor Borough. One of these is now extinct, a second is confined to a single site, and the third is much declined though still widespread. This paper reviews the historical records, then describes the present status of the two extant species based on observations by the author during the years 1983-87.

Huperzia selago (L) Bernh. ex Schrank & Mart.

A species which seems never to have been common in South East England, though during the 19th century it was widespread in discreet colonies on North East Hampshire heaths. Changes in land use, drainage and general loss of lowland heath have led to its near extinction in Southern England. *Huperzia* was last seen in Surrey in 1915 (Lousley, 1976) and in the New Forest part of Hampshire in 1906 (Rayner, 1929). It is not impossible that it survived in North Hampshire until the turn of the century, but there are no published records. Victorian botanists seeking heathland specialities usually visited known New Forest localities, leaving the North East of the county poorly explored.

In the middle of the 19th century *Huperzia selago* grew in two parts of the region on Eversley Upper Common and on the heaths west of Aldershot. All records date from 1840-70, though one account (Kingsley, 1918) hints that the species persisted until later in the century.

There are several references to the Farnborough or Aldershot area (Broomfield, 1850; Townsend, 1883), all probably indicating the same places. Broomfield gives two sites: "heaths near Aldershot; near Caesar's Camp", both in c.1845. Watson, quoted by Townsend, states "near Farnborough", but as he was in the habit of walking as far as Fleet and Aldershot his record is possibly one of Broomfield's sites. It can be dated only approximately, to the early 1860s, a time when there were numerous low lying wet heaths in the district. One other locality is given by Broomfield, with some precision: "drawing a line NNW of Caesar's Camp, by the canal", where the plants were "very fine". This he regarded as the best site. The location must have been in Gelvert Bottom, probably on Pondtail Heath or Pyestock Common (sometimes called Fleet Heath), in kilometre square SU 82.53.

To the north of the region was another group of records. R. S. Hill of Basingstoke collected plants on Hazeley Heath in 1863 (Townsend, 1883). The central or southern part of the Heath, to the east of the Reading road, would seem the more probable location. Across the valley of the River Hart is Eversley Upper Common (nowadays called Bramshill Forest by the Forestry Commission, or erroneously Warren Heath by Ordnance Survey). Here, in about 1870, Rose Kingsley was finding, "In the bogs ... here and there the rarer Fir Clubmoss" (Kingsley, 1918). Clearly she knew it from more than one place. At the time the bogs were extensive: "Each spring had formed a hollow sometimes half a mile long, filled with deep bog. Several of these were hundreds of yards in length and breadth..."; but even by 1918 they were much drier due to the combined effects

of the increasing colonisation by fir trees (sic) and man's demand for water. There were four main areas of bog: Castle Bottom, Birch Bottom, Bracknell's Bottom and Warren Heath Bottom. Only the first of these survives today as bog; the others were drained and Eversley Upper Common has long been a conifer forest.

Summary
Aldershot Common, c.1845; possibly same area, c.1860 (84.50.); Caesar's Camp, c.1845 (83.50.); Gelvert Bottom, c.1845, "very fine" (82.53.); Hazeley Heath, 1863 (75.58.); bogs on Eversley Upper Common, c.1870 (78.58.; 78.60.). Now extinct. (Suggested km. squares for the localities are given in brackets).

Lycopodium clavatum L.

There are actually fewer records for Stagshorn Clubmoss, though elsewhere it was commoner and has not declined as severely as the preceding species. It was "common" by Caesar's Camp in c.1845 (Broomfield, 1850), but there are not later records, though suitable habitat still exists. R. S. Hill collected it somewhere near Fleet Pond and apparently knew it there from 1862-70 (Townsend, 1883), but there is little heath in the vicinity today.

Rose Kingsley knew *L. clavatum* from two places near Eversley in about 1870, until 1909. She records. "It grew freely above the old sandpit on the way up to Bramshill Park, and clothed the line of ruts among the heather of the ancient pack horse way on the Flats with its long trails as well grown as any that ever came from Scotland. In vain I have sought for a plant in either place since the great fires of 1909". It was evidently common enough to delight young children, who would "gather it when the antlers were ripe and full of powder, then they would make sham lightning by shaking the yellow dust into a lighted candle".

"The Flats" would be Hartfordbridge Flats, at the south east extremity of Eversley Upper Common; the ancient trackway is almost certainly the Welsh Drive. The area indicated is likely to be what is now Blackbushe Airfield. The sandpit which identifies the other site is not marked on any old map which I have consulted. However, it was by the track which led up over the Common from Eversley Rectory to Bramshill Park. This still exists, though since 1920 the Common has been coniferised, felled, dug for gravel and replanted.

After apparently being present for about 40 years, *L. clavatum* was certainly not seen for the next nine. Soon after, conifer planting began. Gravel quarrying took place around 1970, followed by replanting in 1974 (Forestry Commission information). As a part of the restoration a pond was created on the high ground above Bramshill Park. It is beside the old track which Rose Kingsley must have walked. By 1985 the new pond had developed a remarkable flora. The banks are red with thousands of *Drosera rotundifolia* each summer. *Myriophyllum alterniflorum* and *Pilularia globulifera* are plentiful. Beside a ditch which drains into the pond are *Hydrocotyle vulgaris, Carex binervis, Oreopteris limbosperma, Osmunda regalis, Lycopodiella inundata* ... and *Lycopodium clavatum.*

The *L. clavatum* was discovered on 2nd December, 1985, when I noticed about ten plants growing on gravel beneath birch scrub on the bank of the ditch. The colony has persisted, a group of ten or so plants and one outlier. On a recent visit, in March, 1988, there were twelve plants, but in addition I came across another 15 growing a little to the west. These were on the banks of the pond, also under birch scrub, but some amongst *Polytrichum commune* almost at the water's edge. These plants may well have been present in 1985 as I did not search the pond banks for more.

The Eversley Common plants may be the only *L. clavatum* in VC 12 now. (A colony in Chawton Park Wood near Alton was reported in 1973 (*Watsonia,* 1977); I am not

aware of it being confirmed recently). It is remarkable that the species should reappear after an apparent absence of some 75 years so close to where Rose Kingsley knew it, and after such upheaval and changes to the Common. However, in all probability no botanist visited the area for many years after the conifer planting; *Lycopodium* may have thrived unobserved (perhaps as a result of dormant spores disturbed during the planting in the 1920s?).

Summary
Caesar's Camp, c.1845 (83.50); near Fleet Pond, 1862-70 (82.55.); Hartfordbridge Flats, c.1870-1909 (80.58.); Eversley Upper common, c.1870-1909 (76.59.) refound 1985, 1987, 1988.

Lycopodiella inundata (L) Holub
Townsend (1904) was able to describe this species as "rather common", though he only listed four sites on the North East Hampshire heathlands. This is a plant of bare peat on wet heathland, a habitat which was formerly locally plentiful in the region. It is not improbable that *Lycopodiella* was widespread and relatively common in suitable habitats during the last century.

Kingsley (1918) reported it from the bogs of Eversley Common, where she regarded it as common. Perhaps it formerly grew in association with all of the main areas of bog. (She actually gives the name "Common club moss *Lycopodium selaginoides*", an obvious error of nomenclature.) Her article recalled the 1870s, but in it she made no comment about disappearance after the 1909 heath fires. It is likely she knew the species at Eversley for 40 years. There is also a record from Hazeley Heath by Miss Palmer for 1886 (Townsend, 1904). In the herbarium at Reading University there are plants collected by Monckton in 1921, labelled "Hardfordbridge Flats, Yateley". It has not been seen either here or at Hazeley recently.

One of Townsend's localities which is still extant is Hawley Common. He cites "NE margin of Hawley Pond, 1879". Monckton collected it on Hawley Common in 1921 (Herb. Reading) and there is a further record from near Hawley Lake in 1955 (Lady Anne Brewis, personal communication). There are still several colonies on Hawley Common. *Lycopodiella* is also still found on heath at Aldershot, where it was known by Caesar's Camp, c.1845 (Broomfield, 1850) and near Aldershot (perhaps the same site), reported by Tate (Townsend, 1883). Dr. Tate's manuscript covers the years 1858-72, but records are not ascribed to any particular year.

***Lycopodiella inundata:* Modern Records**

In July 1983, I was told, somewhat frivolously, to look out for *Lycopodiella* on the heaths at Fleet. Not, at that time, appreciating the rarity of the species, I did not take the remark as at all improbable, and within the week had found a hundred plants at Crookham. More colonies quickly followed: near Caesar's Camp, another at Crookham and several at Hawley. These and subsequent discoveries have been recorded in most years since.

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SHORTER NOTE

The Fern Gazette

Because the *Fern Gazette* is a journal specialising in the scientific aspects of pteridology quite a few gardening members of the BPS have, quite understandably, opted not to take it. However, very often there are articles of wider interest which do contain information of use to gardeners, therefore, for an experimental period we will publish abstracts of selected papers from the previous year's issue in the *Pteridologist*.

Abstract of 1988 Fern Gazette

Main articles:

A chromosome count from *Azolla filiculoides* by You-Xing Lin and Anne Sleep.

Cytological and anatomical observations on *Tmesipteris* species from New Caledonia by A.F. Braithwaite.

Shoot temperature measurements of montane *Cyathea* species in Papua New Guinea by M.J. Earnshaw, T.C. Gunn & J.R. Croft.

A very interesting article drawing attention to night temperatures experienced by montane tree-ferns *(Cyathea gleichenioides* & *C.atrox)* at altitudes of 3500 metres above sea level in Papua New Guinea. Apparently overnight sub-zero temperatures occur occasionally within the tissue of the croziers and fronds; however, the apical growing point at the trunk apex is protected by leaf bases etc. and rarely, if ever, falls below freezing. The lowest ground temperature recorded was -9.1°C (15.6.°F). Tree-ferns occur up to 3800 metres on these mountains where it is presumably colder, therefore this article presents clear evidence that these Papua New Guinea species of tree-fern (and others) are relatively cold tolerant and well worth trying out-of-doors in sheltered areas of Britain.

Pteridophytes of Zarate, a forest on the western side of the Peruvian Andes by Blanca Leon & Niels Valencia.

Twenty three species of pteridophytes are reported from this forest; of these seven occur at 4000 metres or more and would be worth trying out-of-doors in Britain - if spore becomes available.

A field survey *Pteridium aquilinum* mycorrhizas by H.M. Jones & E. Sheffield.

Adaptive strategies of *Marsilea* in the Lake Chad basin of N.E. Nigeria by Jan Kornas.

Shorter notes:

Dryopteris villarii a new high mountain species in the Carpathians by Halina Piekos-Mirkowa & Zbigniew Mirek.

The range of this species is extended into the Carpathian Mountains of Eastern Europe.

Lygodium japonicum in Singapore by Y.C. Wee & L.L. Chua.

Dryopteris x gomerica new for Europe by R. Viane.

Dryopteris x gomerica (D.aemula x D.guanchica) has been recorded from Northern Spain - the first record for Europe. Characteristics of the hybrid and both parents are given.

Book reviews:

Liebmanns Mexican Ferns by J.T. Mickel.

Ferns of Malaysia in colour by A.G. Piggott.

Obituary:

Irene Manton

MARTIN RICKARD

VARIATION IN THE MOUNTAIN FERN

MARTIN RICKARD
The Old Rectory, Leinthall Starkes, Ludlow, Shrops. SY8 2HP

In the past many varieties of Mountain Fern *(Oreopteris limbosperma)* have been described. A glance through *British Ferns* by E.J. Lowe (1891) reveals that he recognised 77 types. It is clear that a lot of these were of little garden value but there is no doubt that there were also many gems on this list. I suspect, however, that they were never widely circulated among growers; even Lowe had seen only half of these plants. Birkenhead's catalogue, about 1888, reveals only one variety on offer, viz 'Cristata', while Stansfield's catalogue of about 1900-1910 (reprinted by the BPS in 1979) includes 10 varieties – and all were rather expensive. Perhaps Stansfield's prices put buyers off, or maybe the plants went to the wrong gardens where they could not survive without special attention? Either way, it is particularly galling to think that as late as 1910 such first class varieties of *O.limbosperma* as 'Angustifrons', 'Barnesii', 'Congesta', 'Coronans', 'Cristata', 'Cristata-gracilis', 'Grandiceps' and 'Ramo-coronans' were available commercially. Today original clones of all have been lost – or if you know different, please let me know!

Of course in recent years we have kept an eye open for varieties of .Mountain Fern but it tends to grow in acid moorland conditions, not favourable to a wide range of fern species; such habitats do not get searched very frequently, perhaps they should! Looking back to Lowe's list of 77 varieties, only 4 were raised, while over 70 were wild finds – there is a moral here somewhere!

Anyway, the cupboard is not completely bare. A few varieties have been found lately. Those known to me are:-

1. Angustifrons type. A narrow leaved form with a tapering, caudate tip to the frond (see Fig 1). I found this as a young plant by the side of a forestry ride in the Radnor Forest in Powys in 1985. It is presumably similar to the original 'Angustifrons Wollaston' found by G. Whitwell in Patterdale many years ago.

2. Cristata-gracilis type. Pinnules confluent, frond apex and pinnae minutely crested (see Fig 2). The tips of many upper pinnae are gently curved towards the tip of the frond, reminiscent of *Dryopteris filix-mas* 'Martindale'. I found this, again as a young plant by a forestry ride, in the aptly named Fernworthy Forest on Dartmoor in Devon in 1978. Druery found his famous 'Cristata-gracilis Druery' at Sticklepath in 1888 only about 6 miles away – I sometimes wonder if my plant shares some of the same blood! I have been unable to find an illustration of Druery's plant to check!

3. Revolvens type. Pinnae concave, with all edges turned down, otherwise normal (see Fig 3). Not a great find but nevertheless quite eye-catchingly different among a large stand of normal Mountain Ferns. I found this on the BPS Meeting at Brampton in the Eastern Lake District in 1984. Its discovery was not greeted with much enthusiasm, then or since, but I like it! W.H. Phillips found a 'Revolvens' at Newcastle, County Down, probably a better form than the one depicted here.

4. Cristata type. Recently found as a young plant in West Scotland in 1987 by Anthony Pigott. The plant was apparently heavily crested on all terminals but it is sadly not in cultivation, nor does a herbarium specimen exist.

5. Crispata type. The finding of this plant by John Barnett was reported in the *Bulletin* in 1980, p 78. I have not seen a plant but it is perhaps similar to 'Crispata Jones' found on Clougha Fell in Lancashire many years ago.

6. Dwarf form. Found near Ludlow in 1985, apparently constant after 3 summers.

For the record, types 1, 2, 3 & 6 plus, of course, the normal species, make up the *Oreopteris limbosperma* part of the NCCPG (National Council for the Conservation of Plants and Gardens) National Collection of 'Thelypteroid' ferns (also includes *Gymnocarpium, Thelypteris, Phegopteris* etc.). I hope one day that it will be possible to distribute these clones more widely and also that new forms will be added to the collection. I certainly intend to keep hunting, I hope others will too!

Varieties of *Oreopteris limbosperma*
Fig. 1. Angustifrons type. Fig. 2. Cristata-gracilis type
Fig. 3. Revolvens type.

BOOK REVIEWS

FERNS, THEIR HABITATS IN THE BRITISH AND IRISH LANDSCAPE by Christopher N. Page. Pp. 430, 21 colour photographs and over 160 photographs and diagrams in black and white. Collins, London in the New Naturalist series. 1988. ISBN 0 00 219382 5. (limpback edition), 0 00 219383 3 (hardback edition). Price £10.95 (limpback).

At last, after a wait of 40 plus years, a volume on ferns has been added to the *New Naturalist* library. While the wait has been inordinately long, it is tempting to say it has been worth it! Although, in the preface, Dr Page apologies to those who have passed-on waiting! This book is, of course, an ecological survey of the ferns of these islands. It is in the best traditions of the series and I doubt if anyone could be better qualified to tackle this subject than Dr Chris Page. Certainly, I found the book very readable and full of interesting information.

Unlike other fern books the format is not a systematic list of entries on each of our native British pteridophytes. Instead, the book works through all the fern-rich habitats of these islands discussing them one by one in great detail, explaining interactions between species and, where appropriate, including hybrids and associated flowering plants. I particularly liked the section on man-made landscapes - it is fascinating to contemplate how rare many of our ferns would be without banks, walls, railways, canals and even castles. Dr Page points out that *Polypodium australe* is nowhere so frequent as on our ruined castles.

In a book of this scope there are many points which invite comment. First of all the nomenclature will not be accepted by all. I applaud the continued use of *Polypodium australe* (instead of the hopelessly misleading *P. cambricum)* and also the continued inference that *Cystopteris dickieana* is really confined to the Scottish east coast. However, I suspect there will be hotter comment on the names given to the subspecies of *Dryopteris affinis.* Perhaps this book went to press before the subspecific name *stillupensis* was sunk in favour of *cambrensis,* and the hybrid *D. X tavelii* sunk in favour of *D. X complexa,* but this cannot be the reason for including subsp. *robusta.* For quite a while now this taxon has been reduced to varietal status within *D. affinis* subsp. *borreri* (see Jesson, 1985 *Brit. Fern Gaz:* 13, 1). Overall, I think the coverage given here to' this complex species is perhaps a little out-of-date and therefore best treated with caution.

Two new hybrid horsetails included here will be new to most readers; these are *Equisetum X bowmanii (E. telmateia X E. sylvaticum)* and *E. mildeanum (E. pratense X E. sylvaticum).* I think all the other taxa included have been documented in other recent books e.g. *The Ferns of Britain and Ireland,* Page (1982), and *The BM Fern crib,* Camus & Jermy (1987).

Some statements have surprised me, e.g. *Dryopteris submontana* is described as endemic, yet similar tetraploids are recorded from southern Europe. Is Dr Page suggesting our plant is different from continental material? Also, is the occurrence of *Adiantum capillus-veneris* in Cardigan Bay a misprint? Finally, the founding of our Society is given as 1892 - the year, of course, was 1891.

Throughout the book Dr Page allows himself to conjecture freely. This adds greatly to the value of the book and stimulates thought from the reader. I was initially surprised to see *Woodsia ilvensis* described as a pine-wood plant but on reflection I can see some logic in this. Certainly, in what I believe is its only station in France it is on a rock outcrop shaded by conifers.

The clarity of all the illustrations is very good. They include habitat studies and close-ups of most of our British species. The black and white photographs could have been

brighter on better quality paper, but the colour plates are excellent.

Despite some minor errors, including those brought out above, all round I think this book is a very valuable addition to our library of books on British pteridophytes. At £10.95 it is almost unbelievably realistically priced! Every home should have one!

MARTIN RICKARD

A MONOGRAPH OF DRYOPTERIS (PTERIDOPHYTA: DRYOPTERIDACEAE) IN THE INDIAN SUBCONTINENT by Christopher R. Fraser-Jenkins. Pp. 154, 79 black and white photographs. Botany series, 18, 5 in the Bulletin of the British Museum (Natural History). 1988. Price £30. ISBN 0 565 08023 7.

Over the last ten or so years Christopher Fraser-Jenkins has been publishing a formidable stock of reference works on the genus *Dryopteris.* Several of these have appeared in the *Bulletin of the British Museum (Natural History)* but this is by far the most comprehensive account to date. It is a complete monograph recognising 57 species of *Dryopteris* from the Indian subcontinent. Seven new species are described, i.e. *Dryopteris austro-indica, D. caroli-hopei, D. darjeelingensis, D. himachalensis, D. khullarii, D. madrasensis* and *D. sledgei* together with eight new hybrids. Inevitably in a work like this there are some new combinations, but mercifully only seven!

The species are arranged in sections according to the classification outlined in Fraser-Jenkins (1986). Under each species a wide range of detailed information is given. Each entry includes synonymous names, full description, cytology (where known), ecology and distribution worldwide and in the Indian subcontinent, as supported by herbarium specimens. Full notes and a photograph of at least two pinnae from a mature frond complete the account of each taxon.

The uses of this book are many but to the fern grower the greatest value will be attached to the illustrations, the comprehensive notes on each species and, particularly, the altitude range - and hence hardiness. Of the 57 species of *Dryopteris* included, 27 occur naturally at 2700 metres or higher (up to 5000 metres in the case of *D. serrato-dentata)* and therefore are almost certainly hardy. Most of these are additional to the list given in Rush (1984) and several appear to be handsome species likely to make good garden plants, e.g. *D. pulcherrima* and especially *D. sikkimensis.* Of course, it is highly likely that many species only recorded at altitudes lower than 2700 metres will also prove hardy. There is clearly much room for experimentation here!

In summary, this is a mammoth work completed to a very high standard. The author, and no doubt the Editors, are to be congratulated on its clarity and accuracy. At £30 it is expensive but reasonably priced in view of the years of work which have gone into its production.

FRASER-JENKINS, C.R. 1986. A classification of the genus *Dryopteris, Bull. Br. Mus. Nat. Hist. (Bot.)* 14(3).
RUSH, R. 1984. *A Guide to Hardy Ferns,* British Pteridological Society, London.

MARTIN RICKARD

FERNS AND FERN ALLIES OF THE UPPER YARRA VALLEY AND DANDENONG RANGES by Paul Gullan & Neville Walsh, illustrated by Anita Podwyszynski. Pp. 102, 1986. Dept. of Conservation, Forest & Lands, Melbourne. ISBN 0 7241 5947 9. Price A$8.95 + $4.35 p & p (c. £6.00).

This little book has just reached us and is certainly worth bringing to the attention of members. The first 20 pages contain interesting notes about the natural vegetation communities and habitats of ferns in this attractive hilly country in SE Australia, within a day's excursion of Melbourne. The rest of the book is descriptions of some 54 spp.

of pteridophytes found there with an illustrated key to these species. Each description is beautifully illustrated by line drawings and for each species there are two maps; one showing the distribution in the State of Victoria; the other a more detailed one of the area examined by the booklet.

CLIVE JERMY

THE NEW MUSEUM OF NORTH DEVON - A COMMITMENT TO FERNS, PTERIDOLOGY AND PTERIDOMANIA

PETER BOYD
Museums Officer and Curator,
Museum of North Devon, The Square, Barnstaple, Devon EX32 8LN

The new Museum of North Devon will display and interpret the natural and human history of northern Devon and adjacent areas, using material brought together for the first time from a number of museums, private collections and other sources.

Several collections will be of national importance but one will be unique in the manner in which it transgresses boundaries that often exist between natural science, garden history, fashion and the decorative arts, and include a living element that is unusual in museums.

It is FERNS as plants for scientific study *and* cultivation *and* as subjects of fashion and motif for decoration that will form a link between natural science and social history displays and include both herbarium and fernery.

Objectives of the Museum relating to Ferns argue that Ferns, Pteridology and the history of Pteridomania should receive special attention because of:-

(a) the significance of ferns as a conspicuous element of the natural history of northern Devon;
(b) the importance of the Fern Herbaria (collections of pressed ferns) already in the collections;
(c) the importance of Fern Fossils in the collections;
(d) the significance of pteridophytes in the geological history of Devon where Devonian, Carboniferous, Jurassic and Tertiary rocks yield fern and other pteridophyte remains;
(e) the special role that Devon played as a focus for Pteridomania in Victorian times (an aspect of the social history of Devon);
(f) the involvement of several notable North Devon personalities with Pteridomania;
(g) the presence of specialist collectors and fern nurseries in northern Devon in Victorian times;
(h) the Devon origin of numerous fern cultivars recognized in Victorian times.

The Athenaeum building (see photograph opp. p.278) was vacated by the libraries in April 1988 and purchased by North Devon District Council. The building is now called the Museum of North Devon and is undergoing the first phase of conversion during the period January to May 1989. The work is being funded by North Devon District Council, Museums and Galleries Commission and the Area Museum Council for the South West. The first phase will cost about £180,000 (in addition to the cost of purchase).

Ferns, Pteridology and Pteridomania will be served in a number of ways to cater for every type of visitor whether he or she has a particular specialist interest in ferns, the decorative arts or garden history - or a complete lack of awareness of ferns prior to visiting the museum:-

(a) **A Fernery**
A Victorian-style conservatory will be built on the north side of the museum building.

This will house an unheated fernery that will form part of the main circulation of the Ground Floor and hold a collection of British fern species, cultivars and hybrids planted in fern beds and rock-work with special facilities for those species requiring constantly high humidity.

Plans for the Fernery have been approved by the Council and the doors to and from it will be provided in the first phase. However the main work on it will probably commence in autumn 1989 to enable it to open in spring/early summer 1990. It will cover approximately 100 square yards but have a larger planting area because soil and rockwork will rise up the solid re-inforced sides of the conservatory and within it to a height of about 9 ft. The cost will be approximately £50,000.

The Fernery will not only allow people to see British ferns at close-quarters (even if confined to a wheelchair) and appreciate variety within the species but also play a part in preserving old varieties (including those, but not exclusively those, first collected or raised in Devon);

(b) **Displays on the Natural History of Ferns**
The Fernery will be linked to displays, within the main building, explaining the biology and ecology of ferns;

(c) **Displays on the Social History of Ferns**
These displays will consider the relationship of man with ferns including myths, magic and pteridomania.

A fairly large collection of ferny artefacts will be displayed in the first phase with an introduction to their significance as evidence for the Victorian passion for ferns. It has been possible to build up a sizeable collection of Victorian objects employing ferns as the dominant motif. The objects range from chairs to tea-pots and utilize materials including glass, pottery, cast-iron, silver, silver-plate, wood, paper, papier-mâché, stone, jet (see Brooch phot. opp. p.278), lace and other textiles.

It is the intention that this will ultimately form, in effect, a 'National Collection of Pteridomania'.

(d) **Displays on the Geological History of Pteridophytes and the significance of Fern Fossils**
The displays will include fern fossils in their various guises both macroscopic and microscopic, describe the place of ferns in the history of plant evolution and the commercial significance as contributors to coal and in the dating of rocks. There will be a reference collection of fossil material in addition to the displays.

(e) **A Fern Herbarium**
A room has been set aside to house the pressed plant collections and some collections of fossils, insects, eggs, shells, coins and other material stored in cabinets for reference rather than permanent display. It will therefore be possible for *bona fide* researchers to study material under discrete supervision.

The herbaria originally donated to the Barnstaple Literary and Scientific Institution or North Devon Athenaeum were placed in the care of North Devon Museums Service in April 1988. The Fern Herbaria comprise several thousand herbarium sheets, some bound together and some loose, including British, European and non-European material originating from many of the most significant amateur and professional scientists of last century. They date predominantly from between 1830 and 1880 with just a few from early this century. A detailed account of the collections is in preparation.

These herbaria are of considerable historic importance and provide, in some cases, the only evidence for the former occurrence of particular species in certain localities;

however there is a need for a modern herbarium collection of ferns. This new collection has been started and will be developed by collecting fresh material in Devon and further afield *with special emphasis upon variation within British species, hybrids and garden cultivars.* Microscope slide material will be prepared in appropriate cases to supplement the pressed fronds. Fresh material will not be collected from species at risk (which are in any case well represented in the historic collections). Old collections of pressed ferns will still be acquired whenever possible, particularly if they contain Devon specimens.

Some albums of ferns have great social history interest which may outweigh their scientific value (e.g. nineteenth century albums of artistically arranged New Zealand Ferns acquired recently - the Victorian version of a "coffee-table" book").

(f) **Fern Database**

North Devon Museums Service will be involved with biological and environmental recording of several types. Ferns and other pteridophytes will be one of the groups concentrated upon with emphasis on certain key habitats and localities as well as mapping of the distribution of taxa. Records will be linked to specimens collected for the herbarium and, on some occasions, if appropriate, to living material collected for display in the Fernery where changes in habit or morphology under cultivation may be studied.

The database will also include information on people associated with ferns, old fern collections, old fern nurseries and so on (particularly relating to Devon but not exclusively so).

Records relating to rare species or other sensitive records will be kept confidential if it is thought necessary or when the person providing the record requests for it to be so.

(g) **Fern Library**

A good start has been made in building up a first class specialist collection of books and other printed material relating to ferns embracing technical monographs and popular works on taxonomy, ecology and cultivation back to Bolton 1785. The collection already amounts to several dozen items.

Strangely enough, the North Devon Athenaeum had only Lowe's *British Ferns* and a volume of Jones' *Nature Prints of Ferns* (part of the set). Unfortunately these were sent (with a large number of fine illustrated antiquarian books) to auction at Phillips in London in 1988 as surplus to the requirements of the Rock Trust. The Museums Officer had to bid in open auction to "save" Jones' Nature Prints for the museum. Several of the fern varieties illustrated by Jones were first collected or raised by Devon collectors and growers such as John Dadds of Ilfracombe.

(h) **Special Publication on Devon Ferns**

The Museums Officer is not only gathering information and material for the displays in the museum but also for a well-illustrated book on "Devon Ferns - their natural and social history" which will complement the displays and Fernery.

It should not be thought that the Museum of North Devon will be a museum devoted to Ferns. That is very far from the truth but when the planned developments described here come to fruition there will be no other museum in the country that will be able to reflect such a range of aspects of the study of ferns and their social history and give people the opportunity not only to learn about them but *enjoy* them.

The Athenaeum building, Barnstaple in about 1895 - now the Museum of North Devon

Victorian Jet Fern Brooch c.1840, 5cm x 4cm, Museum of North Devon (Photograph by Peter Boyd)

Osmunda regalis in the garden at Greencombe, Porlock, Somerset
(Photograph by Christopher Potts)

Asplenium trichomanes 'Incisum Moule' var. *Moulei* Moore
(Photograph by Christopher Potts)

SHORTER NOTES

Osmunda regalis, past and present

It is some years since I last reconnoitered areas of the north coast of Cornwall for *Asplenium marinum* and *A. billotii.* This autumn I decided to spend a couple of days returning to well remembered spots where the two species were found.

Environmentally little has changed, with the exception of minor cliff falls. Frequency of *Asplenium marinum* and *A. billotii* also appears static.

Whilst looking up from the beach at a clump of *Asplenium marinum* I was very surprised to see a small colony of *Osmunda regalis* sporelings growing quite happily in a cleft of the rock facing. On further inspection there was no doubt the sporelings were *O. regalis,* growing in little more than half decomposed rock. To my knowledge there are only a few *O. regalis* plants growing in the area and these are about a mile away inland as the crow flies. Wind is unlikely to carry spores to the cliff area which is, of course, facing the sea and open to the full force of the Atlantic Ocean; sea gulls would appear to be the most probable means of spore transport. I cannot imagine a long life for the *Osmunda* sporelings in their present home - I must return in due course to observe their survival struggle.

I remember as a young fern enthusiast during the twenties in the Gweek district, walking through quite large areas of *O. regalis,* growing in boggy, undrained soil under light tree cover; on a recent visit I saw no signs of the fern, doubtless due to drainage and other modern cultivations. I do not believe *Osmunda regalis* was ever removed on a large scale for commercial sale reasons in Cornwall, as was *Adiantum capillus-veneris.*

Memory also brings back wonderful specimens of *O. regalis* growing along-side a wide stream running down to the sea behind Kennack Sands on the Lizard peninsula. Kennack Sands is now a well-known holiday resort with a caravan park behind the sands - time marches on!

KENNETH ADLAM

(For a reminder of *O. regalis* as a garden plant see photograph opposite. Ed.)

The Centenary Fund

The Society is taking advantage of the coming Centenary to launch an appeal for a new fund - The Centenary Fund. Money from this fund will be used to promote the study of all aspects of pteridophytes: horticultural, scientifc, educational, whether it be by amateurs, students or professional pteridologists. As such its use will be much wider and more flexible than the other fund - The Greenfield Fund. Naturally, neither of these funds will be used for the general running costs of the Society.

Application for support will be invited from the Centenary year onwards and details of how to do this will be published near that time.

We have received a substantial donation to start the Fund but now I ask you all to dig deep in your pockets for a donation. However large or small donations may be, all will help to establish the viability of this Fund and ensure its success in promoting our interest in the subject.

There is an insert in this issue of the Pteridologist which will enable you to make your donation to our Treasurer with relative ease.

BARRY A. THOMAS, President

NEW FERN VARIATIONS - USA

JUDITH I. JONES
1911 4th Avenue West, Seattle, Washington 98119, USA

Adiantum Pedatum Selections

In Volume 1, Part 3 of the *Pteridologist* I reported on the appearance of a population of crested *Adiantum pedatum*. Since then I've had notes and comments from many BPS members around the world wondering what has happened with this extraordinary strain which Jimmy Dyce and I dubbed *Adiantum pedatum* 'Tasselatum'.

My initial reaction to the cresting was that we had somehow received spore contamination from some tropical crested Maidenhair. But such contamination was a mystery in itself as we do not even grow any tropical ferns nor do we handle the spore of such. Then after two winters, albeit mild ones, when the number of plants went from over fifty to less then ten, it seemed most likely that somehow this tasselled Five-Finger Maidenhair must have tropical parentage mixed with its cold hardy genes.

Luckily, throwing out the deceased crowns was not the last possible avenue of inquiry left to pursue. The purchase of a wild collected plant of *Adiantum pedatum* subsp. *aleuticum* from an Oregon nurseryman gave me a new direction to pursue when it produced a few crested fronds this summer. The plant was bought in June of 1987 and did not exhibit any abnormalties during that season's growth. We had had a specimen of *A. pedatum* subsp. *aleuticum* collected in Eastern Washington sitting with our Western Washington spore stock. In a greenhouse environment with controlled feeding and watering the *A. pedatum* subsp. *aleuticum* lost its characteristic strongly ascending fronds of obliquely angled pinnules. When the spore is harvested, fronds are cut from all the stock plants and mixed together. This is a possible explanation for a parentage of *A. pedatum* subsp. *aleuticum* although that particular specimen had not exhibited any cresting tendencies to my knowledge.

Given this new lead as to the possible lineage behind *A. pedatum* 'Tasselatum' I began to look closely at the few remaining plants we had left. Considering the unique proclivity of *A. pedatum* subsp. *aleuticum* for an exposed situation on high magnesium, low calcium soils derived from ultramafic rock (that is peridotite, dunite, and serpentine), being plunked into peat laced with nutritional "goodies" and nestled into a shaded greenhouse was not the sort of pampered life that suited this rugged mountain inhabitant.

The Oregon plant of *A. pedatum* subsp. *aleuticum* is in an open sunny position at the top of a lava waterfall with its "toes" tucked under an adjacent piece of lava. Although no ultramafic rubble has been added to the surrounding soil this specimen is flourishing and steadily increasing in girth. I suspect that if our remaining *A. pedatum* 'Tasselatum' are to flourish we need to expose them to more light and replant them in a mix laced with serpentine bits.

Although spore was sown of the *A. pedatum* 'Tasselatum' in late 1986 and 1987 none of the spore flats (trays) had produced any crested plants until this year, but now I see that of the almost two dozen plants one has a crest. It seems that it takes at least two years for the sporelings to mature enough to exhibit crested tendencies.

We have selected another *Adiantum pedatum* strain not for its radical departure from the norm but for its greater reliability as a commercial product. In the process of sowing and growing two to four thousand *A. pedatum* subsp. *subpumilum* per year we have experienced a 1% reversion rate. The great attraction of these throwbacks to normal is that the stipes tend to be sturdier and produce a greater quantity of fronds. We are in our second season of offering this robust "frondiferous" strain to our customers, the majority of whom are landscape professionals who require uniform fully developed material.

We used to pick our spore from a small selection of varied Western Washington Five-Finger Maidenhair. Not surprisingly, the progeny were varied along the normal speciation lines, from tight fully billowed specimens through to tall scraggly ones which became hopelessly entangled in close nursery growing conditions. It is obvious that the more fronds a fern has the greater its appeal to the customer. The further advantage of the thicker stipes also means that we have less breakage when pulling stock for sale and therefore less time and space wasted on recuperating damaged stock in space needed for growing on.

I realize that part of the fun of being a hobby grower is to experiment with highly variable species and to take the time to grow on those which seem the most exciting. But in a commercial nursery situation a high degree of variability can spell financial loss. So we are most pleased with the low degree of variability from spore that our reverted strain has shown after three years of successive sowing, growing, and selling.

A crested form of *Polystichum imbricans* subsp. *imbricans* (see Fig.1)

Of the fifteen species and subspecies of Polystichum listed for the continental United States and Alaska fourteen are located in the western region. Ten of these are found in the Pacific Northwest, which includes Northern California, Oregon, Washington, and Southern British Columbia in Canada. One of these species is a dominant coastal feature of overwhelming abundance leaving the remainder ranging from frequent to exceedingly rare occurence in localized areas. One can have thoughts of blasé indifference to those which are thoroughly underfoot, as is the case of *Polystichum munitum,* to covetous cravings for the elusive and sublime alpine treasure *Polystichum kruckebergii.*

Extreme and distinctive variation, even among the massive populations of *Polystichum munitum,* is not common so it is with great excitement that I am reporting a wild find of a crested *Polystichum imbricans* subsp. *imbricans.* Boyd Kline and Jerry Cobb Colley of Siskiyou Rare Plant Nursery in Medford, Oregon found a mature crested plant near the headwaters of Footes Creek in south-western Oregon. They had been asked by the owner of the property to go in to rescue a population of *Cypripedium montanum* as the area was due to be sprayed with defoliant by the lumber company in preparation for logging. Boyd spotted the fern down in a dark ravine under a heavy canopy of pine, fir and madronne. It was nestled among the tumbled boulders in isolation from any other Polystichum populations. When first collected it was almost fifteen inches in height and due to the shady situation did not exhibit strong *P. imbricans* characteristics so it was thought to be a *P. munitum* variation. However, after a couple of years in a garden situation with bright indirect sun it became apparent that this find was that of the less abundant *P. imbricans* rather than *P. munitum.*

Polystichum imbricans subsp. *imbricans* occurs from southern British Columbia to Southern California, mostly along the Sierra-Cascade mountain range axis in rather dry rocky woods. It is a medium sized fern rarely exceeding 15 inches in height by 4 inches in width. The linear-lanceolate fronds are narrowed further as the pinnae fold inward and twist horitzontally in a unique non-planar venetian-blind fashion. The greatest width is at the centre as the frond is almost truncate at the base while the acuminate apex evenly tapers off. When pressed flat the pinnae are generally imbricate or overlapping.

I was fortunate enough to receive a division of the original find about four years ago. The first two years I had it it remained quite small, about 4-5 inches, and produced less than half a dozen fronds per season. The next two years it was tucked in a lava outcropping on the southeasterly side of an exposed rock garden mound. It has produced spore the last two years and despite a few decapitated sporing terminals it has more than enough fronds to make it a valued addition to the alpine scene.

Fig. 1. A crested form of *Polystichum imbricans* subsp. *imbricans*

The fronds range in height from 6-10 inches and in width from 1½ to 2½ inches. The pinnae margins are pungently spinulose and when viewed horizontally with a hand lens curve upward from the pinnae surface. There is a decidedly pronounced rigid spine on the upper pinnae auricle. The pinnae tips are neatly flaired and pleated fan fashion. Towards the upper third of the frond the rachis begins to fasciate in preparation for the twisting, transversely crossed multiple cristulate terminals. I find the whole plant one of symmetrical restrained elegance despite one local grower's slur about "that hideous crested *Polystichum imbricans* from Siskiyou (Rare Plant Nursery)".

I don't know if this crested form will prove as elusive from spore as its parent but I intend to keep trying even though last year's spore culture met with a fungicide overdose. There is always this year to begin again, and to hedge my bets I have two spore packets ready for Ray and Rita Coughlin and Martin Rickard to try their hand at. Far be it from me to selfishly accept all the responsibility for a thorny challenge!

1. As of yet this form has not been designated with a varietal appellation. I have submitted the frond to Jimmy Dyce along with my suggestions.

2. Boyd Kline is one of the founders, along with Lawrence Crocker, of Siskiyou Rare Plant Nursery. Jerry Cobb Colley and Baldassare Mineo took over the reins some years ago and are maintaining the prestigious reputation of this internationally known nursery by expanding the selections of alpines and other dwarf, hardy plants for the Woodland and Rock garden. The most exciting ferns to be had were produced by this nursery when I first became interested in temperate ferns.

SHORTER NOTE

Pteridophytes on stamps

The Botany Department of the National Museum of Wales has a small collection of stamps on botanical subjects which we are actively seeking to increase. Within our collection there are a number of recent sets of stamps that depict pteridophytes. A list is given here for the interest of anyone who might wish to obtain them. It is not claimed to be complete. Where the sets are mixed, only pteriodophyte stamps are listed.

ASCENSION ISLAND (1980) - 6 stamps: 3p *Anogramma ascensionis,* 6p *Xiphopteris ascensionense,* 18p *Dryopteris ascensionis,* 24p *Marattia purpurascense.*

BELIZE (1978) - 6 Christmas stamps: 15c *Lygodium polymorphum,* 45c *Adiantum tetraphyllum,* $1 *Thelypteris obliterata.*

DEUTSCHE DEMOKRATISCHE REPUBLIK (1984) - 6 fossils (3 plants, 3 animals): 25p *Botryopteris* (Permian).

EIRE (1987) - 24p *Phyllitis scolopendrium,* 28p *Ceterach officinarum,* 46p *Trichomanes speciosum.*

GUERNSEY (1975) - 3½p *Asplenium x sarniense,* 4p *Isoetes hystrix,* 8p *Asplenophyllitis microdon,* 10p *Ophioglossum lusitanicum.*

POLYNESIE FRANCAISE (1986) - 6 Medicinal plants: 40F *Phymatosorus,* 53F *Ophioglossum reticulatum.*

TUVALU (1987) - 15c *Nephrolepis saligna,* 40c *Asplenium nidus,* 50c *Microsorum scolopendria,* 60c *Pteris tripartita.*

USSR (1987) - 4K *Scolopendrium vulgare,* 5K *Ceterach officinarum,* 10K *Salvinia natans,* 15K *Matteuccia struthiopteris,* 50K *Adiantum pedatum.*

VENDA (1985) - 12c *Pellaea dura,* 25c *Actiniopteris radiata,* 30c *Adiantum hispidulum,* 50c *Polypodium polypodioides.*

BARRY A THOMAS

BRITISH FERNS - *a video made by M.H. Rickard and B.A. Thomas. 1989. 25 mins. VHS recording system. Please send stamped addressed envelope for details to A.R. Busby, 16 Kirby Corner Road, Canley, Coventry CV4 8GD*

This interesting venture generously supported by Schering Agriculture, as part of their *Green Science* programme, and the National Museum of Wales, is not usual material to review in our journals. However, as copies of the tape are being lodged with the B.P.S. for loan to interested groups it is worth giving some comment on the programme's content.

The aim of the video is to introduce the audience to ferns in Britain, and I counted some 47 species mentioned. Most were shown in portrait, some with close-ups of the significant parts, and for the most part the camera work is competent, the zooming smooth and I found nothing to irritate me or divert my whole-hearted attention from the ferny content. Even the commentary, delightfully spoken in a soft Welsh accent (not fully appreciated by our Scottish members!), was well written and music was totally absent. It can therefore be said to be successful.

I am sure the makers would not edit it the same way, or shoot some of the same frames, should they be asked to do it again. Much will have been learnt, and it is not fair to be critical of this 'film', especially by one who has limited experience of cine-photography, and none whatsoever of shooting video-tape. I did, however, feel that the introductory shots introducing fern habitats, could have contained more ferns rather than sequences of open moorland, devoid even of bracken, it seemed. But one appreciates that woodland is dark and not easy to record. The old problem of subject merging with background reared its head with Moonwort and Adder's Tongue but, to compensate, the shots of both Woodsias were outstanding. I would have liked more comparative shots, e.g. both Woodland *and* Alpine Lady ferns, and perhaps the Buckler ferns together rather than separated on ecological grounds.

Cameras and lenses are also a limiting factor in such ventures and equipment normally available to a professional crew might well have produced better close-ups and smoother camera pans. All in all, the makers of this tape are to be congratulated. To anyone who wants to encourage other botanists, naturalists or gardeners to get interested in ferns, I say, "Borrow this tape and put on a show". I think you will get a high number of converts.

A.C. JERMY

BOOK REVIEWS

FLORA OF SOUTHERN AFRICA: PTERIDOPHYTA by E.A.C.L.E. Schelpe and N.C. Anthony. Pp. vx, 292 + 96 full page figures and 241 distribution maps. 1986. Department of Agriculture, Pretoria. ISBN 0 621 08877 3. Price in South Africa R46.30; other countries R55.60 (post free).

Only three years after publication of *The Ferns and Fern Allies of Southern Africa* by W.B.G. Jacobsen (1983) we have this new account of the pteridophytes of broadly the same region. This book attacks the subject in the manner established for other African fern floras by Dr Schelpe, i.e. Zambesiaca (1970), Angolensis (1977) and Mozambique (1979). There are a few introductory pages which lead straight into the systematic section. Here each genus and species is described in concise scientific language, with the majority of taxa illustrated by line drawings. A new venture for this series of Floras is the inclusion of very clear distribution maps. Altitude ranges for most species are included but are sometimes confusing, e.g. *Cyathea capensis* is given for the range 1370 - 1800 metres. I have only seen it at less than 1000m.

There has been a conscious decision to use nomenclature as established in Dr Schelpe's

other floras. Inevitably this has led to some problems. For example, some authors would argue that, within *Cheilanthes, Dryopteris* and *Polystichum,* species have been split too much, while in Hymenophyllaceae and Aspleniaceae, species accepted elsewhere have been grouped together. Such problems are, however, for the specialist taxonomist and do not detract materially from the value of the book.

Inevitably, comparisons with Dr Jacobsen's 1983 flora will be made. Jacobsen's book is more than just a flora, containing much of the information missing here, including full accounts of ecology and plant communities; it is a book to read and enjoy. Schelpe and Anthony's book is more a book for reference.

In summary, any serious student of Southern African ferns would need both these books, but where a choice must be made I feel the Jacobsen book will give a more rounded understanding of the ecology and identity of the ferns of Southern Africa.

MARTIN RICKARD

A HANDBOOK OF FERNS FOR AUSTRALIA AND NEW ZEALAND by Christopher J. Goudey. Pp vii, 212, 98 photographs including 25 in colour. Lothian Publishing Melbourne, Sydney and Auckland. Hopefully, available from BPS Booksales in the near future for about £10, or $19.95 from Australia.

Fern growing in Australia really is booming. Hot on the heels of the *Fern Encyclopaedia* (reviewed in 1988), here we have a book listing ferns suitable for culture in Australia and New Zealand. Of course, the information will also be of great value in other parts of the world although, as ever, we in the United Kingdom must be cautious about interpreting Australian hardiness. As a rough guide I guess that a plant hardy in Australia would probably do well in favoured Cornish gardens but not necessarily elsewhere in Britain without protection.

The body of the book is an alphabetical catalogue of fern species plus some varieties, with instructions on their cultivation. There are some illustrations, either in colour or in black and white. I particularly admired a large colour plate of *Polystichum cystostegia* – the Mountain Shield Fern from New Zealand, and a view of a suburban garden in Melbourne dominated by tree-ferns.

A very useful feature at the end of the book is a section on where to see ferns in Australia and New Zealand, both in gardens and in the wild. This section will be indispensible to me if I am ever fortunate enough to visit that part of the world!

The book also includes other standard sections such as how to identify ferns, fern propagation and fern pests and diseases. All round it is a good book produced at a reasonable price which I think will be of greatest value to anyone with facilities to grow ferns in sheltered conditions or in favoured climates.

MARTIN RICKARD

THE FERNS AND FERN ALLIES OF RADNOR by R.G. Woods in The Radnorshire Society Transaction, 1987, p10-21.

Although not a book, I think this excellent article deserves to be brought to the attention of members. It is in fact the first account of the ferns of Radnorshire. Each species is treated in detail, often with a distribution map and an historical account of its discovery. Many interesting species occur e.g. *Hymenophyllum wilsonii* and *Pillularia globulifera,* but the author admits the area is still underworked. This article will perhaps provide the stimulus to attract more pteridologists to explore the wonderfully wild country of Mid-Wales.

MARTIN RICKARD

BOOK REVIEWS

FERN NAMES AND THEIR MEANINGS by J. W. Dyce. Pp iv, 31, 1988. British Pteridological Society. ISBN 0 9509806 1 7. Price £3 post free from BPS Booksales. Americans ordering single copies of this book can save time and postage by enclosing US $5.50 with their orders

At long last, at the age of 83 and after writing hundreds of first rate articles on ferns, Jimmy Dyce has written his first fern book! Inevitably, it is a book for the fern grower and one which is sorely needed. In a few years' time I suspect we will wonder how we ever managed without this information in such an easily accessible form.

The book begins with an introduction in which Jimmy's love of Latin varietal names is made clear. This is followed by the body of the book which is split into several sections, all based on a tabular format. The etymology of British fern genera names (their derivation) is followed by two chapters on the meanings of Latin and Greek word elements appearing at the beginning and end of fern names. Finally there is the glossary, the main section of the book. This is introduced by a very brief lesson in Latin. The table here runs to 18 sides and over seven hundred varietal names, with each entry very clearly defined. To take some examples, 'Fimbriatum' is explained as 'margins of the frond deeply and finely fringed' or 'Laxum' as 'parts distinct and apart from one another, or in an open loose arrangement'. Varieties named after people, such as the Lady Fern 'Frizelliae' after Mrs Frizell, are also included.

The more one scans this list the more one agrees with Jimmy's plea to see these names perpetuated. It is indeed difficult to accept that such a legacy of names built up over 150 years through the peak of the Fern Craze can not be applied to new varieties named in the future, or legally since 1959. However, fortunately, those ferns in cultivation now, and for the foreseeable future, will be predominantly old varieties, all legally named following the scheme explained here by Jimmy Dyce.

For the future this book should be the key to a wider appreciation of ferns - and their names. Every grower of fern varieties will surely want a copy.

MARTIN RICKARD

AN INTRODUCTION TO THE FLOWERING PLANTS AND FERNS OF LOCHBROOM AND ASSYNT by Colin Scouller OBE, with an APPENDIX ON GAIRLOCH by Peter Clough. 33 pp., 1 map. Lochbroom Field Club. 1988. Available from Peter Harrison, Upper Bridge Cottage, Leckmelm, Ullapool, for £1.65 including postage.

About half the vascular plants recorded for the parishes of Assynt, Lochbroom and Gairloch are covered in this account of the flora. As the booklet title suggests it is only an introduction, but a very good one. Over 40 species of fern and fern ally are mentioned, often with clues for separating critical species. Arctic-alpine species of ferns feature strongly, e.g. *Polystichum lonchitis, Athyrium distentifolium* and *Dryopteris expansa* but the lowland flora is also of great interest with *Osmunda regalis* and *Lycopodiella inundata.* Furthermore, *Asplenium billotii* occurs here in its most northerly locality. Unfortunately, hybrids are outside the scope of this handbook, hence *Polystichum X illyricum (P.lonchitis X P.aculeatum)* which grows in the Inchnadamph National Nature Reserve is not included. Altogether this is a most welcome publication which will be particularly useful to botanists holidaying in this magnificent region.

MARTIN RICKARD

BRITISH FERNS AND THEIR CULTIVARS

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